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ORIGINAL ARTICLES

THE COMMON GROUND OF ORTHODONTIA AND PEDIATRICS*

BY ROYAL STORRS HAYNES, M.D., NEW YORK, N. Y.

THE common ground of orthodontia and pediatrics is the interest which the practitioners of each branch have in the principles which underlie growth and function. The specialty of orthodontia focuses its attention through a glass of high magnification upon a restricted area of the human body—the bones of the jaws, the teeth and the muscular apparatus pertaining thereto; the specialty of pediatrics, with, perhaps, less minute detail but, let us hope, with equal sincerity of purpose, views the whole structure of the young individual and all his functions. It is a matter of degree; not a difference in quality of application.

Some specialists who have a limited anatomic field for their study tend to lose interest in general problems. It is to the great credit of the practitioners of orthodontia that, viewing intensively as they do such a limited anatomic field, they yet do not lose sight of the interrelationship of their work to the general problems underlying all work with children, but are seeking with diligence and enthusiasm to comprehend all the phases of the wider problem, so that their work may have a truer basis and so that their results shall be in harmony with the whole body structure. It is an evidence of this broad and forward looking spirit, which demands the application of all the knowledge available as to heredity, environment and nutrition to the correction and prevention of faults in the oral structures, that you have asked to address you one whose knowledge of your particular field is limited but whose interest is sincere in all the spheres of knowledge you are bringing to bear upon the efficacy of your work.

Proper growth is essential to the success of any endeavor in the care of the young individual. Freedom from illness and the enjoyment of good health

*Read at the Twenty-ninth Annual Meeting of the American Society of Orthodontists, Nashville, Tenn., April 8-11, 1930.

make a sufficiently good criterion when it is a question of the adult. But he who is progressing toward the adult state must develop, must grow, in an orderly and adequate manner if he is to attain, as an adult, that structure and that excellence of function which shall serve him satisfactorily through life. This applies equally to that very important part of the body to which the orthodontist gives his attention and to the whole organism which is the province of the pediatrist.

We both, then, orthodontist and pediatrist alike, are concerned in all that has to do with the growth of the children who come under our care. I think that we may and should help each other. Certainly the orthodontist needs for his future patients careful preparation so that he may have good material to work on; and in that extension of his work toward which he is tending, preventive orthodontia, he must have intelligent pediatric care to supplement his efforts. The pediatrist, on the other hand, can be greatly aided in putting into effect proper hygienic and dietetic procedures if the orthodontist will aid him. The correction of a malocclusion is a thing into which parents enter because they have to and largely, but not wholly, because there has been some previous deficiency in the treatment of the child they present. If the preventive-minded orthodontist can use the condition of the child under his care as a text to preach the need for careful attention of other and younger children, he can do much to make parents seek and accept what the pediatrist is anxious to give them; but which they often endeavor to do without because they do not realize that indifference during the early years of a child's life may have to be paid for later. The somewhat unusual quality of the visit to the orthodontist may be used to awaken them to realities which the pediatrist sometimes finds it hard to make them appreciate.

It has seemed to me that a survey of the processes of growth will serve to give a background of common understanding from which the orthodontist and the pediatrist may work together. It must needs be somewhat cursory, for it is a broad subject and time is not without limit. However, I think from such a survey we can draw conclusions as to definite procedures which will be mutually helpful.

To understand the principles which underlie growth, we shall have to go together back of the fields of our own active work into that of the obstetrician, and, perhaps, also into the sphere of inquiry of the embryologist and of the student of heredity.

They will not be able to tell us what the growth impulse is. No one knows just what that force is which, upon the union of the male and the female elements, starts the process of development of the individual which through many vicissitudes and acted upon by many influences produces the embryo, the infant, the child, the man.

But they can interpret for us some of the characteristics of this growth impulse, its potentialities, its reactions to environment, its modifications as a result of the action of the physiologic regulators, the effect upon it of good or of bad nutrition, and of proper or improper use of the structure this growth impulse is creating.

The starting of life and growth, at the time of fertilization, is the point at which focus two streams of heredity, which, from millions of ancestors, have been converging from generation to generation until they meet in this newly begun individual. Traits which have been carried on in the germ cells of unnumbered persons are here brought together, and the imprint of the lives of all his ancestors is on the developing descendant. This does not mean that the new individual has at his disposition, so to speak, all the characteristics of his predecessors. A selection has been going on which has permitted the handing down of some, but not all, the ancestral characteristics. In both the male and the female elements, which fuse to make the new being, there has been a division of the nuclear material which carries the inheritance. This division is qualitative, a species of selection within the male or the female cells whereby are discarded one half of the characters which the germ cells of either parent have inherited from their parents. For instance, in the case of the germ cell of a mother, the offspring of grandparents one of whom had blue eyes and the other brown, and who, probably, herself, would be brown-eyed inasmuch as the unit character of brownness of eyes is a *dominant* character and likely to prevail over the *recessive* blueness, this germ cell would, in preparation for being fertilized, discard, by means of a qualitative division of its nuclear material or chromosomes, one or the other of these characteristics and present for the formation of the new individual only one of them. After the union of this cell with a male germ cell similarly prepared by division, there is a still further division of the nuclear material formed by the union of the nuclear material of each of these two cells, so that the developing egg will have potentialities which represent a selection from the characteristics of both parents. Thus it is that a child will resemble both father and mother and be identical with neither. Thus it is that a child will resemble a grandparent more strongly than his parent; for it may happen that a character of that grandparent, transmitted in a concealed or recessive state through the parent, will be the characteristic selected by the division of the nuclear material of the fertilized ovum for the newly begun individual.

It need not be simply a trait of appearance which is thus transmitted; it may be a combination of endocrine glands, which will affect the interrelation of the developing parts of the new being; or it may be a tendency to rapid or to slow metabolic rate which likewise will determine the kind of individual who is to be produced.

Transmitted by heredity are potentialities. Whether those potentialities shall or shall not become manifest in the child will depend to a great degree upon the environment in which the egg shall develop. True there are good eggs and bad eggs—in scientific thought as well as in common parlance. Defective health in either parent, intoxication of any sort at the time of conjugation may in themselves constitute a primary blight which foredooms the fertilized ovum to defective development or early death.

The growth of the fertilized ovum, with all its hereditary potentialities, proceeds first by division into a larger and larger number of cells. At a certain stage in the multiplication of cells the cell mass begins to separate into layers of cells. Somewhat later, the cells of each layer begin to differ-

entiate and form the different structures and organs of the body. These, then, in accordance with definite patterns and with definite rates and times of growth, develop into the size and form and arrangement which obtain in the body of the infant at birth. Certain organs and certain systems continue their development after birth to accommodate the infant to individual life and to subsistence in a new environment.

That this growth from a one-celled individual to an infant consisting of millions of cells highly differentiated into tissues and organs all functioning together, shall be orderly and undisturbed, requires that the environmental factors surrounding its development shall be favorable. Among the factors most important for successful development are a suitable temperature, a proper food supply, an adequate provision of oxygen. These, in the case of the human embryo, are afforded by its enclosure in the interior of the body of the mother, where the temperature is constant and physical shocks are avoided, and by the establishment of the placental circulation which permits the transfer from the mother's blood of food and oxygen. During the interval elapsing between fertilization and the development of the placenta, the small store of food in the egg itself suffices.

Anything which interferes with the maintenance of optimum conditions of environment will interfere with development. With the effect of variations from such optimum, the science of experimental embryology concerns itself, and from the studies of experimental embryologists much has been learned which may be translated into procedures for the governing of the hygiene, the diet and the activities of the pregnant woman.

Apparently most factors which interfere with orderly development do so by affecting developmental rate. It seems that there is an early stage of cell multiplication where interference with the developmental rate need not materially affect the integrity of the final product. But when a certain degree of differentiation has taken place, and particularly, when the different layers have begun the formation of individual organs, a change in the rate of development, from whatever cause, may produce anomalies of almost any type and degree. In the case of any one organ, there is a critical period, in the very early stages of its growth, when it is particularly susceptible to change in its developmental rate. Interference at this critical period may be disastrous to the future anatomic and functional perfection, while, later, when it has progressed further, the same amount of interference may have little, perhaps no, effect.

Growth in the embryo seems to proceed for a certain time in one axis, the longitudinal, for instance; and while this longitudinal growth is taking place, lateral growth seems to be inhibited. This is analogous to growth in plants, which, while they grow actively in height, will put out few, if any, lateral shoots. In the plant, also, if, while growth is proceeding actively in height, the terminal bud is pinched so that growth is interfered with, the lateral buds will immediately begin actively to put forth sprouts and branches. This is utilized in growing fruit trees in espalier. Different organs in the embryo, as they develop rapidly exert a similar inhibiting effect on other organs. If by some change in environmental conditions, such as a lowering

of temperature, for instance, their rate of growth is altered, other organs may progress at a greater rate than is normal; or, the growth of an organ having been checked during a period when rapid growth is to be expected, at the critical period especially, when the hindrance to development has been removed, this organ may not be able to resume a normal rate or make up for the loss incurred during the period of arrest. There is a differential between the rate of growth of various organs at definite times, which, if it is once upset, may be permanently and perhaps disastrously altered.

It is by the application of such factors, by the interference with developmental rate at specific times and to specific degrees, that the experimental embryologist has been able to produce all sorts of anomalous conditions and to explain the occurrence, in obstetric practice, of the many and peculiar abnormal forms.

There is a very interesting chapter of our subject which concerns the modifications of the growth impulse and the tendencies inherent in the germ plasm by the so-called physiologic regulators, the various endocrine glands.

These organs, of which we recognize about a half dozen, produce their effects through the action of an internal secretion or hormone. These hormones have definite actions on body processes, such as metabolic rate, growth, metamorphosis from immature to adult forms, etc. Often they collaborate in producing a result; sometimes their actions are antagonistic. They are intimately related one to another, and the various associations they form are many, so that the study of their actions is one of the most complicated with which we have to do.

These physiologic regulators exert their effects both before birth and throughout life. They determine in large measure the form and the functions of the body. Probably the endocrine state of an individual is inherited. By this we mean that he starts out with a definite type of interrelation of hormone forces, and according to the type he inherits, his structure will be built, if environmental factors do not interfere. In a broad sense, the make-up of any person may be considered as the expression of the combined actions of all his endocrine glands. This accounts for the striking resemblances seen between individuals and races which are far apart in regard to inheritance and habitat. The anthropologists have devoted a great deal of attention to the actions of the endocrine glands, and from their very wide observation they have formulated a "hormone theory of development" which accounts admirably for the variations to be noted between men and animals, and the changes which have taken place in the structure of man from prehistoric times to the present day.

In relation to growth, two endocrine glands are of more than ordinary importance. These are the thyroid and the pituitary. This is not to say that others, as the adrenal and the gonads, do not affect growth; merely, the result of the actions of their hormones is less easily demonstrated.

It is not uncommon for an infant to be born a cretin. A cretin is one who has a severe deficiency of the hormone of the thyroid gland. He is short; with a body long in proportion to the extremities, for the processes of growth in his long bones have been deranged; he has a broad shallow face

and small jaws, for here also growth has not taken place normally; his skin is thick; his hair coarse and dry; his abdomen is prominent; he is mentally retarded. Without the administration of the thyroid hormone, he will not grow normally, will remain unintelligent and will not metamorphose. Fortunately, if he is given the necessary internal secretion, he will develop somewhat. But under the most favorable circumstances, his condition is not recognized until after birth and often not for months; he has gone through that intensely active period of embryonal life with deficient endocrine activity, and the effect of deficiency during that time probably never can be entirely overcome.

Two other abnormal conditions of growth seem to be related to abnormality of thyroid secretion. They both show peculiarities of bony development which are not unlike the changes seen in the frankly thyroid deficient cretin. These are mongolism and chondrodystrophy. In these conditions, the developmental aberration cannot be changed by the exhibition of thyroid substance. Something has happened before birth which has set them in the way they must go. In the case of the Mongol, this something has profoundly affected the life process itself, and Mongols seldom grow up. The embryo destined to chondrodystrophy has a high prenatal mortality. If he lives, he is resistant, will grow a little, may mature and bear children but remains always a strikingly unnatural human being, of small stature, with very short arms and thighs and a peculiar configuration of the head and face. He may be intelligent and witty. Many court jesters of the Middle Ages, as we see in the art of the epoch, were chondrodystrophic dwarfs.

There are other dwarf individuals who are symmetrically proportioned. Some of these remain infantile in form and function throughout life; but others may mature and produce offspring, only remaining tiny. Such persons have been found to have pituitary glands of subnormal size.

Opposed to these are the giants, in whom growth has been exaggerated so that their stature is above that of normal human beings. They may show little abnormality of proportion, especially when they are young; but almost all of them show even in early life configuration of face, hands and feet which proclaims them to be suffering not only from a too great supply of the growth principle of the pituitary which regulates stature but also of that which produces growth in response to functional demand. Later in life these signs usually become more pronounced and the symmetrical giant becomes the giant with acromegaly.

Acromegaly is a growth disturbance which is known to be associated with a large pituitary. It may occur in persons of normal stature where the overactivity of the pituitary has begun after growth has ceased; it may occur as the end-result in an individual who has always shown an acceleration of growth. Almost always a less than normally fine modelling of the face and body may be detected in early photographs of a person who finally becomes acromegalic; but it often is so slight as only to be recognized in the light of subsequent events. The changes of acromegaly take place in all the structures of the body, even to the development of new and larger muscle fibers. But the most notable signs are seen in the face and head, the hands and feet. It

seems as if a real growth process had been reawakened to supply material for a functional need, although that degree of functional need may not have existed for thousands of years. All parts of the mandible become larger and all parts of the maxilla except the alveolar margin and the hard palate. The attachments of the temporal muscle and of the masseter, and these muscles themselves, increase in size. The frontal bone enlarges, and the frontal sinuses become more capacious. The lips and cheeks become heavier. These changes in this area are of striking interest to us because they reproduce in an exaggerated form the process by which the apparatus of mastication in a child of five years, say, becomes modified into the adult apparatus. The other changes in the head are such as would be demanded by a neck musculature which was trying to adapt itself to the leverages demanded by a heavy-jawed head, part of an individual who used his jaws for biting and tearing against resistance. The final picture of the acromegalic with protruding jaws, heavy face and beetling brows is striking and a little terrifying. The skull of such an individual resembles markedly that of prehistoric man; and it is this resemblance which prompts the anthropologist to draw the conclusion that the changes which have taken place, and which can be demonstrated to be still taking place, in the human body from the old stone age to the twentieth century have been due to a progressive change in the action of the hormone of the pituitary gland.

It is from a consideration of the extremes of action of the physiologic regulators that their importance as modifiers of growth has become evident. The normal lies somewhere midway between these extremes.

The deviations from normal may be infinitely small. We may not be able to recognize any abnormality in the children who come to us, but we must realize that the apparently normal children all differ because they have been acted upon by varying combinations of internal secretions affecting their growth process.

The forces which direct and modify the growth impulse cannot build the structure of the child who is our concern without building material. They cannot create a good body structure without suitable building material. This building material must be available in amounts which shall suffice for the structure to be built; in proportions which shall permit of the proper combinations for good quality of built structure, as in the mixing of concrete certain definite amounts of sand, gravel and cement must be employed if the concrete is not to crumble. And as in the erection of a house, there must be skilled mechanics to put the materials together correctly, though they themselves are not part of the finished edifice, so in the building of the child's body chemical agents are necessary to direct the processes of building.

The human body, however, is not exactly like a house which can be built completely before it functions. It is rather a machine which works while it becomes larger and larger. For this work it requires a source of energy, fuel for its fires, requires substances which may be used up in making it go. If it has not these, it will burn some of the material which should be used for building, and the building process will be hindered or stopped or the structure even partially destroyed.

The furnishing of building and energy materials and the other, the directing substances, which are requisite for growth, is the domain of the science of nutrition with which pediatrists occupy themselves so intensively and which is so important for orthodontists, interested in good bony structure, that they study it also. Realizing that how the pediatrist has fed the child who comes to the orthodontist helps or hinders the success of his endeavor, he puts himself in the position of demanding that the preparatory work of the pediatrist in this matter shall be good.

The science of nutrition occupies itself with food. With increasing knowledge food has come to represent a much more complex idea than once it did. Years ago food was largely considered to be a supply of albuminous substances (or proteins), starchy substances (or carbohydrates), and fatty substances. Now we think of these and, in addition, water, mineral salts, and the accessory food substances or vitamins, directing substances, the mechanics of our housebuilding simile. And where we considered proteins as such, we now consider the type and construction of the proteins, knowing that according to their possessing or not possessing certain combinations of amino-acids, of which eighteen or twenty are known to enter into the composition of proteins, they are suitable or unsuitable for the best nutrition. In the case of mineral salts, of which twenty years ago five or six were considered essential as food constituents, we now enumerate twenty or so which play a necessary part in nutrition, and to this number methods of spectroscopic analysis are almost daily adding others. In regard to vitamins, which at the time of the World War were beginning to be recognized, we now have six fairly definitely understood, with indications constantly occurring that the actions attributed to some of these may be due to more than one substance. We are progressing toward the middle of the alphabet in choosing letters to name them.

This increasing complexity in the science of nutrition is not unnecessary elaboration; it is the result of more precise thinking. It has resulted, and it will further result, in better direction of the feeding of human beings, in their better growth and their greater resistance to disease.

I have said that for growth we must furnish building material. The building material in our food comes with the proteins and the mineral elements. These constitute the structure of our tissues and organs, our bones and muscles. I have said that this building material must be suitable; it must be of such character that from it can be constructed the peculiar types of substances of which we are made. If the proteins in being digested do not supply the necessary combinations of amino-acids for synthesis into human proteins, the chemical builders of our bodies will not utilize them for building and we shall not grow.

In the second class of building materials, the mineral elements, we have much of common interest. It is they which make up the bulk of the bones and teeth; it is they which maintain the alkalinity of the body fluids and tissues, accomplish the exchange of oxygen and carbon dioxide, control the amount of water in the tissues and the elimination of toxic products through the kidneys, as well as help in the formation of digestive juices and regulate

the contraction of the heart and other muscles. If they are not supplied, the body cannot function, neither can it grow.

Of the twenty or more mineral elements known to exist in the body, we are interested particularly in calcium, magnesium, sodium, potassium, phosphorus, sulphur (the only mineral element which cannot be supplied by itself but must be contained in a protein), iodine chlorine fluorine, iron, copper, and perhaps manganese.

One of the most important elements in growth is the carrying of oxygen to the tissues. For the carrying of oxygen, iron in the form of hemoglobin is necessary. For the formation of hemoglobin, in addition to iron, copper and manganese in minute amounts are necessary to make iron combine with the other constituents of the hemoglobin molecule.

Sodium and potassium are necessary in the plasma and in the cells of the blood to facilitate the removal of carbon dioxide and to maintain the normal osmotic pressures between the blood cells and the plasma and between the plasma and the surrounding tissues.

Iodine is necessary so that the thyroid gland shall be able to elaborate its internal secretion, thyroxin. Chlorine is necessary for the hydrochloric acid of the gastric juice. Fluorine enters into the composition of the enamel, dentine and bones. Sulphur seems essential for tissue respiration.

Calcium and phosphorus, in combination as calcium phosphate, make up the bulk of our bony framework and of our teeth besides having other important functions in the body economy. They are, therefore, of the utmost interest to both pediatrist and orthodontist and are of prime importance as ingredients of the nutriment of the growing child. Their occurrence in foodstuffs, the proportion in which they are consumed (for disorders of bony and dental structure may be in part dependent upon an excess or a deficiency of either, both absolutely and relatively), the manner in which they are maintained at normal levels in the blood, the food carrier, the factors which influence their utilization, their elimination and their storage, all this we study; and we endeavor to apply the results of our investigation.

Of the foods which supply us with energy, the carbohydrates and the fats, we are interested, in regard to growth, in the manner in which they spare protein for building and facilitate the absorption of mineral salts. The growth effect of a diet in one of its aspects is related to the balance sheet of energy production and utilization; for, as we have seen, the human body is a machine which works as it grows. For its work, comprising the basal metabolism (the constant expenditure of energy whether there is use of the body or no), the excretion of waste material and the production of activity, oxidizable material is necessary. Carbohydrates and fats supply this material readily and economically; protein can supply oxidizable material, although uneconomically. If the body needs for this sort of material are not met by carbohydrates or fats, protein will be used; and if protein is thus burned for the production of energy, that particular protein will not be built into the body structure and growth will suffer.

Water constitutes three-quarters of our body tissues and nine-tenths of our blood. It may, then, be regarded as a peculiar kind of building mate-

rial. It is a necessary ingredient of our food, for we see children who do not receive enough water to supply their needs for the maintenance of metabolic processes and of elimination, or, who, receiving an apparently adequate amount, lose too much water through the skin, lungs, kidneys or bowels, and will not grow in the sense of gaining properly in weight.

The studies of the past fifteen years on the directing factors, the so-called accessory food substances or vitamins, have revolutionized our attitude in regard to food and have explained many obscure diseases and effects of development. Such widespread diseases as rickets and scurvy, such distressing conditions as beriberi and pellagra, long known and little understood, have become comprehensible and are by way of being conquered, since their occurrence is known to be associated with a deficiency in the diet of one or other of these directing factors. But perhaps even greater than the result of the newer knowledge of nutrition in explaining, preventing and curing these affections, is the knowledge that no part of the body can function efficiently and develop as it should unless in the diet be included an adequate amount of these substances.

We do not know the vitamins as definite chemical entities like the other food elements; we know in what substances they are carried; one we can produce by artificial means, by the irradiation of ergosterol; but of themselves we know little or nothing. We know them by their works, or by the disorders into which the body falls in their absence.

Vitamin A comes to us primarily by the action of sunlight on plants. Animals cannot synthesize vitamin A but are dependent upon plants for their supply, which they store in their organs and their fat—for it is one of the two fat-soluble vitamins—put it into eggs as food for their young and into the milk with which they nourish the newborn. Created in the green leafy parts of plants, it is most abundant there; it is present but less abundantly in the root vegetables which have received it from their green leaves, particularly root vegetables which are yellow, as carrots and sweet potatoes. Fish obtain vitamin A from eating the microscopic plants which float on the surface of water, bathed in sunlight, and fish oils are a good source of this vitamin. Certain grains in sprouting produce vitamin A and may be utilized as a source of supply.

Vitamin A is a protective vitamin *par excellence*. Without it, growth and the repair of tissue are defective. Resistance to infection through mucous membranes depends upon its adequate provision, and as the occurrence of infections of mucous membranes whether they be those of mouth, throat, lungs or gastrointestinal tract, hinder growth, the protective action of vitamin A aids growth in this manner also. Great deficiency in vitamin A permits of the occurrence of urinary calculi, night blindness and an affection of the eyes known as xerophthalmia. Without vitamin A in some amount, life is not possible for long.

Our chief sources of this vitamin are animal and fish oils—notably cod liver oil—egg yolk, butter and milk from green fed cattle, green leafy vegetables, and yellow root vegetables.

Vitamin B is a water soluble substance produced in plants and occurring chiefly in the seeds or fruits of grains, but also in the green leaves. Its amount varies according to the soil and the manner of cultivation. It is one of the vitamins which has been found to be a complex or more than one substance. Experiments long ago showed that animals fed grains such as rice, from which the husk had been removed, developed a disease of the nerves identical with beriberi, ceased to grow and finally died. Later it was shown that vitamin B stands in close relation to the disease pellagra. Variations in these effects in different sources of vitamin B (wheat germ, for instance, is rich in the antineuritic or beriberi element and poor in the growth-promoting and pellagra-preventing one) and variations in the effects from the same source when it is treated with heat or different solvents, led to the conclusion that vitamin B, as then commonly known, consists of two substances, one antineuritic and beriberi-preventing, and the other growth promoting and pellagra preventing. This latter fraction is now denominated in America vitamin G.

For our purpose these two substances may be considered together, for their occurrence in foods runs nearly parallel. They are essential for the normal activity of the whole organism, for the growth and the repair of tissues, for the proper action of the digestive tract, for the integrity of the nervous system and the activity of muscles. Animals seem to store very little vitamin B, and a constant renewal of the supply is necessary. For life and growth it is probably the most important of all the vitamins. Lack of it retards growth, causes a distaste for food, produces indigestion and constipation, promotes fatigue and may bring on beriberi and pellagra.

Vitamin B is very necessary in the diet of the pregnant woman and the nursing mother. There is evidence that lack of it increases the liability to birth hemorrhage and to abnormalities of the digestive tract. Both for a sufficient secretion of breast milk and in order that the breast-fed child who is dependent upon his mother for all his food shall receive the vitamin B which is necessary for his proper growth, the nursing mother must be sure to take in enough vitamin B. The artificially fed child also may get very little of this necessary element in his milk feeding, and so his diet must be supplemented by other things, such as whole grains and green vegetables.

Cod liver oil and other fats contain none of it. Yeast, while not an ordinary food, is an abundant source of vitamin B.

Vitamin C is contained in citrous fruits, fresh green vegetables, and germinating grains or seeds. It is easily destroyed by heat, alkalies and oxidation. It is, therefore, not present or present in minimal quantities in dried foods or foods cooked long in the presence of air. It is absent in animal or vegetable fats. Its presence in milk is never large and depends upon the diet producing the milk. Milk which is old has lost most of its vitmin C; where milk has been sterilized, vitamin C must be supplied to the child by addition to his diet, and this may be done most easily by the inclusion of the juice of oranges or lemons, tomatoes or tomato juice, fresh raw cabbage or spinach.

The knowledge of the existence of vitamin C came through the study of the effect of the administration of fresh fruit and vegetable juices in the prevention and cure of scurvy. This is a disease accompanied by hemorrhages and interference with the nutrition of the bones and teeth.

Vitamin C is necessary for the proper composition of the blood and the integrity of the blood vessel walls. It is an adjuvant in the formation of the bones and teeth. On a scorbutic diet (lacking vitamin C) there are increased fragility of the bones and marked changes in the dentine and the tooth pulp. Vitamin C seems to be required for the production of intercellular substance in supporting tissues.

We have for centuries been confronted with the disease called rickets, a disorder which results in poor bone and tooth formation, as well as unfavorable conditions of growth and a poor musculature. Rachitic children have developed bony deformities, poor and delayed dentition, digestive disturbances, nervous disorders and shortened stature. Many theories were formulated to explain its occurrence and even today are still being formulated. Crowding, lack of exercise, improper diets low in fat, insufficiency of fresh air and sunlight, and infection have all been alleged to be the cause. Empirically a remedy has long been used—cod liver oil. The coming of the conception of accessory food substances, directing forces of growth, led to a study of rickets and of cod liver oil from this point of view. The culmination of these studies was the recognition of the existence of an accessory food substance—at first confused with vitamin A because it also is soluble and contained in fats—which regulates the utilization of calcium and phosphorus in the body and determines their fixation as calcium phosphate in the bony structures. This is vitamin D.

For vitamin D we are again dependent upon the action of the sun. (Perhaps sunlight might be included as well as air, which brings us oxygen, in a wide application of the idea "food.") But here the action of the sun is more direct. Sunlight, through its ultraviolet rays, can create vitamin D in an animal directly by activating a sterol in the skin, or artificially produced ultraviolet rays may do so. Further, natural or artificial irradiation of substances, oils (animal or vegetable), cereals, milk, yeast, etc., which contain the necessary sterol may create vitamin D, so that it may be administered to those who live where there is little sunlight or whose skins are separated from the sun's rays by houses and clothing, or who have great pigmentation in the skin.

Diatoms, minute plants living in water, bathed in the rays of the sun, develop vitamin D in their body substance. These are eaten by larger but still minute marine animals, which are in turn eaten by smaller fishes. Large fishes, such as the cod, devour the smaller fishes and store vitamin D in their livers from which it is extracted to become a remedy for rickets.

Whether it comes to the child through sunlight or artificial irradiation of his skin, through the ingestion of substances irradiated outside the body, or whether he gets it in animal oils or the yolk of eggs or the fat of milk as

butter, this substance essential for the orderly deposit of mineral substances in growing bones and teeth has its ultimate origin in the activity of short light rays.

Without the regulating influence of vitamin D on the proportion of calcium and phosphorus in the circulating blood and its effect of fixing their combined calcium phosphate in the growing cells, the building up of hard, firm bones and teeth is impossible. With sufficient vitamin D, bone and tooth production may proceed normally if enough calcium and phosphorus are supplied. Not only is normal bone growth possible, but abnormal conditions may be resolved with the administration of vitamin D. Rickets may be healed and carious teeth restored to normal functioning by the deposit of new calcareous material.

Growth cannot be normal without all of the vitamins. Each has its sphere of action, but its activities influence the activities of all the others. It will not suffice to supply plenty of one and neglect the rest. The diet should contain them all, all the time.

If there be periods in the growth history of a child during which there is a considerable lack of one vitamin or another, the growth processes will be altered. It may thus happen, just as in intrauterine life, though fortunately without the same disastrous consequences, that this arrest in development will occur at a critical moment, and as a result there may be a modification in the character and form of his structure which will last through his whole life. It has been shown that the temporary stunting caused by rickets experimentally produced in animals has resulted, although the animals were subsequently properly fed and cured of their rickets, in malocclusions due to a changed rate of development of the maxilla and mandible and to the improper positions in which the teeth grew under changed conditions. The symmetry of growth may thus be changed.

So we see what a large part the question of nutrition, nutrition of the embryo, nutrition of the child, may play in the matter of growth, how it may aid and how it may deter the manifestation of those potentialities inherent in him when his life began.

We have said a great deal about the machine. We must consider a little how it runs. The work the body has to do and the manner in which it does it also have something to do with growth. We have seen that as the body builds up, it also breaks down and does certain kinds of work; we have seen that if not enough energy material is supplied to preserve the building material for its proper purpose there will be an interference with growth. There is another aspect of the energy balance which may create interference. If, while it is building, this machine is not run economically, if the calls for energy output are too great, a theoretically adequate ration may prove deficient and growth may suffer. Here enters the question of function, of the normal and economical use of the body while it grows.

For many years I have been studying this question, and I have had the privilege of addressing some of you, my colleagues of New York, on the subject of the mechanics of the body. As I look at it, "body mechanics" or "posture" as it is often called, means more than simply the maintenance of

the human erect position. It has to do with the correlation of the various parts of the body in the performance of the functions of the body. There is just as much need of considering the posture of the heart, the lungs, the digestive tract, the eyes, as there is of the feet or the shoulder blades. Position cannot be separated from function, whatever part of the body be under review.

If there be an improper correlation of parts, if the position of these parts is maintained incorrectly, the body machine works incorrectly and uneconomically. If the head be held in an improper position, and this was brought out by orthodontists, there will be malocclusion. As the position of the head is determined by the position of the rest of the body, divergence from the normal position, say, of the knees or the back will produce factors which orthodontists, who are concerned with malocclusion, must reckon with in their corrective procedures if they are to achieve and to maintain the results they desire. Malocclusion is, itself, a positional defect, and everyone will readily admit that it interferes with good functioning of the digestive apparatus.

I might go on to show that positional abnormalities of the back, thorax and abdomen are always to be thought of as causing disturbance, of greater or less degree, in the important functions of circulation, respiration and digestion, lowering their efficiency. Now digestion (with its associate, absorption) produces from the food the building substances and the energy substances which we have seen are necessary for the running of our human machine. The respiratory function gathers in the oxygen which is necessary for vital processes, and the circulatory system conveys all these to the localities where they are to be used. If the digestion be not efficient, no matter how well we feed a child, his body will have less than the optimum amount and quality of nutriment. If the respiration be interfered with, the activity of the oxidative processes will be slowed. If the circulation be not adequate, nutritive material may not be supplied where and when and as rapidly as it should be. Obviously the total body function will be affected (and growth will suffer) as a result of improper body position.

One of the greatest demands upon the body's supply of energy is for the production of motion, or, as we term it generically, activity. Improper mechanical use of the body calls for a greater expenditure of energy to accomplish a given form of activity than does proper use. A soldier with a sore foot, which he uses awkwardly, will consume considerably more energy in marching than he ought to; a child who stands in a position which calls for muscular contraction when there should be relaxation, requires just so much more food in maintaining his bad posture as will supply the energy he is wasting. This small extra amount may just suffice to create an unfavorable balance in the energy account, and growth will suffer.

Always we come back to growth. It is the one unfailing standard by which to measure our success in the care of children. In the last analysis, proper growth is the thing we are striving for in all that we do for the children we see.

I hope that this elementary consideration of the factors underlying the common field of endeavor of the pediatrist and orthodontist may make it plain how closely together they are in all their activities; how, working on the same individual, they must both insist on the application of the same principles and employ similar methods. The pediatrist has much to gain by the orthodontist's demand for excellence in the work preparatory to his; the pediatrist shall hope to offer a better preparation as he shall learn how it may be accomplished.

DISCUSSION

Dr. Horton R. Casparis, Nashville, Tenn.—From my point of view as a pediatrician I think you made an excellent choice in selecting one as well equipped as Dr. Haynes is to discuss this subject, "The Common Ground of Orthodontia and Pediatrics." The fact that you have placed such a topic on your program is indicative of a cooperative attitude on your part and is also indicative of a realization that one cannot isolate a certain disordered structure or function of the human being and treat that adequately if one fails to take into account its interrelation to other structures and other functions. In other words, as orthodontists and pediatricians, it is only through a combination and integration of our efforts in behalf of those who come to us for assistance that the best results can be expected. In my contacts with your president, Dr. Oliver, I have been much impressed with the value that can come from such cooperation.

Dr. Haynes has covered his subject so thoroughly and so well that I can find little excuse for discussing his paper. He has told you that the three factors, heredity, the function of the endocrine glands, and nutrition, largely determine growth and development. It is nutrition about which we know most and with which we can do most. Improper nutrition, and the inadequacy may be either in quantity or in quality, seems to play an important rôle in the production of those disorders with which you as orthodontists are concerned. If this is so, and I believe it is, then it devolves upon us as pediatricians in the first place to prevent as many of these disorders as we can through the instruction of parents in regard to the nutrition of their children during infancy and later childhood. Through this means, however, there is no danger of our ever relieving you of your responsibilities. In the second place, if improper nutrition can produce some of the conditions with which you are concerned, then in your correction of these defects it seems important that good nutrition be maintained if there is to be an enduring quality to your work. On the other hand, we recognize the importance of properly functioning jaws and teeth if we expect to get the best results from our attempts at nutritional care, since it is the jaws and teeth that begin the proper management of nutriment for the organism.

Again, resulting partly from poor nutrition with the concomitant weakness of the muscles and lack of tone, and resulting partly from other factors probably, one sees lateral compression of the maxillae with arching of the hard palate. This arching of the palate apparently causes an encroachment on the breathing space of the nose, and this in turn is conducive to frequent upper respiratory infections. These infections in themselves might be quite serious, or at least they make it difficult to maintain good nutrition in a child. Such defects probably can largely be overcome by proper orthodontic procedures. Without going further, it is my feeling that there are many reasons why there should be close cooperation between the orthodontist and the pediatrician.

There is one other subject which I shall mention with some hesitancy, and that is the cost of orthodontic care. This is your affair entirely, but I do hope through the development of clinics and dental schools more of the children of poorer circumstances and of the indigent class, who often need orthodontic care most, may be able to enjoy the benefits of the excellent work which you are doing.

THE REMINERALIZATION OF WHITE SPOTS IN THE DENTAL ENAMEL*

By Charles F. Bödecker, D.D.S., F.A.C.D., New York, N. Y.
Professor of Oral Histology and Embryology, Columbia University Dental School

THE enamel of the teeth is the hardest tissue in the body because of its high percentage of mineral matter. It is composed of a countless number of exceedingly minute rods, held together by a cementing substance. When both the rods and the cementing substance are normally calcified, the enamel shows a high degree of translucency. The varying color of the teeth is dependent, to a high degree, on the thickness and on the translucency of the enamel. Yellowish-white teeth, with a sparkling luster, have an almost transparent enamel which allows the yellow color of the dentine to be visible on the surface. These teeth are considered to be most immune to dental decay. Teeth having a greyish-white or even chalky appearance, on the other hand, show an enamel having a lesser translucency, and as a result the color of the underlying dentine is not so clearly seen. These greyish-white, pearly teeth are considered more prone to decay.

Dental enamel frequently loses its beautiful translucency, inasmuch as certain areas change to a greyish-white. Such white, opaque spots in the enamel develop as a result of an acid affecting the surface of the tooth. This happens only, according to my observations, to the teeth of individuals who are in a poor state of health.

The first action of the acid, in affecting the surface of the tooth, is to remove some of the mineral salts in the cementing substance between the rods, thus increasing the refractive index of the enamel; this results in making it a chalky white.

The destructive change which takes place in enamel when it is affected by acid is best understood by comparing it to a pane of glass. Unbroken glass allows light to pass through it freely; if, however, it is broken into fine fragments, the previously translucent glass is changed into a white opaque mass. The light can no more pass through without interference but is reflected back to the eye of the observer from the innumerable refracting surfaces in the particles of glass, robbing it of its translucency.

White spots in the enamel, when studied under the microscope, refract the light in the same way as powdered glass. Fig. 1 shows a section of enamel having a white spot viewed by *reflected* light. This is analogous to the condition under which we see these white spots on the surfaces of the teeth in the mouths of our patients.

*Read at the Twenty-ninth Annual Meeting of the American Society of Orthodontists, Nashville, Tenn., April 8 to 11, 1930.

We note, under the microscope, that the slightly decalcified enamel (a white spot) offers an obstacle to the passage of the light. It therefore appears white, while the normal enamel does not reflect the light to the eye and therefore appears darker (Fig. 1). The dentine allows the light to pass through it completely and consequently shows black.

Many clinicians believe that no improvement can take place in the condition of the enamel after the eruption of the tooth and that if once such white areas are formed, they can disappear only by the loss of the enamel composing the white spot. This opinion is based upon the well-proved fact that the organ which forms the enamel is destroyed upon the eruption of the tooth and that consequently the enamel must be regarded as a finished product when the tooth takes its place in the mouth. This is true in so far as it

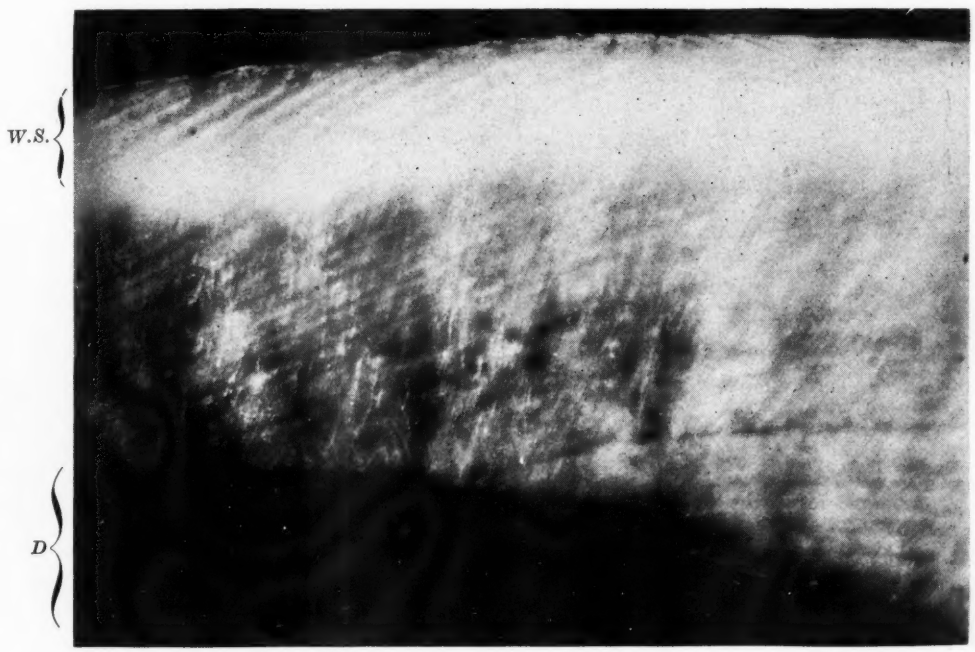


Fig. 1.—Section of enamel and dentine (*D*) showing a white spot (*W.S.*) photograph by reflected light. This is similar to the condition under which white spots are seen on the surfaces of the teeth in the mouth. (Enlarged one hundred times.)

applies to the *form* of the enamel; its hardness, however, is due to calcification which I believe can vary after the eruption of the teeth.

If it were true that the disappearance of white spots in the enamel is caused only by the wearing away of this area, then an appreciable depression would necessarily be visible on the surface of the tooth. Fig. 2, photographed by *transmitted* light, shows a white spot in a section of enamel and indicates to what depth the tissue would have to be abraded or ground away in order to obliterate this defect.

The development of the enamel is still a question, and it is not considered advisable, in this short paper, even to touch upon the embryonal formation of this tissue. The changes, however, which take place in the enamel after the eruption of the tooth, are of importance to the clinician. A ques-

tion under frequent discussion is: Can the enamel of a fully erupted tooth harden after its eruption? This question has been answered in a number of ways:

I. Posteruptive calcification of the enamel *does not take place.*

II. Posteruptive calcification of the enamel *does take place;* this may occur:

(a) From the outside of the tooth by the deposition of salivary salts, or

(b) From the interior of the tooth by the way of channels passing from the pulp chamber through the dentine into the enamel.

I believe that the mineral content of the enamel may be increased from the interior and probably also from the exterior. The latter only, however,

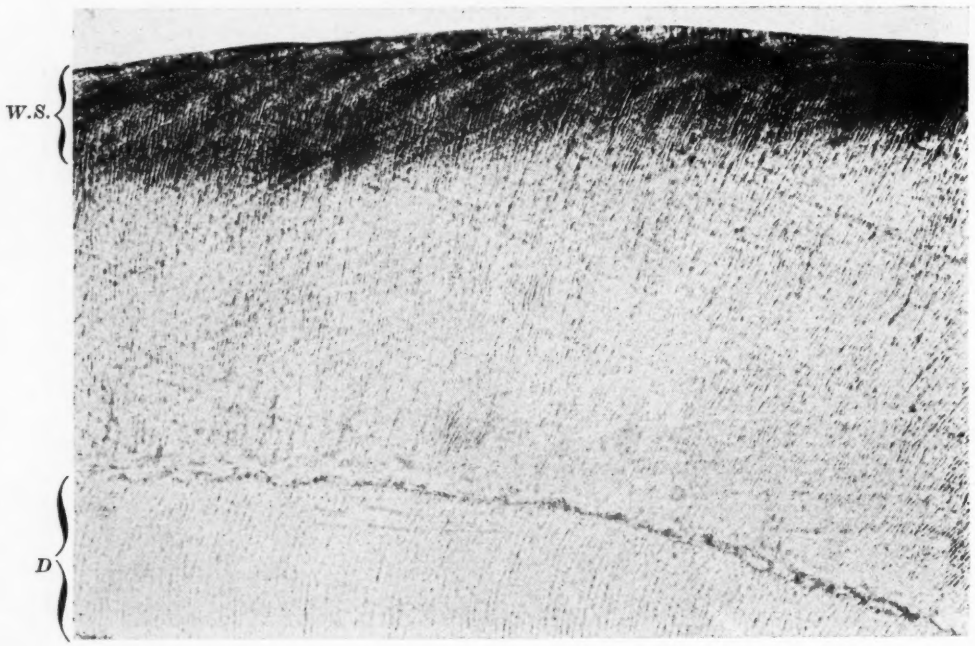


Fig. 2.—The same section as that shown in Fig. 1, photographed, however, with transmitted light. The white spot (*W.S.*) occupies about one-third of the entire thickness of the enamel, in which the enamel rods are seen to be more definitely marked, indicating that the cementing substance between the rods is partially dissolved. This condition may lead to the decay of this surface. The dentine (*D*) can be clearly seen. (Enlarged one hundred times.)

can be considered here; therefore, the office of the saliva will be discussed in this connection.

Viggo Andresen of The Royal Norwegian Institute in Oslo, Norway, has done much in furthering experiments of hardening the enamel from the exterior. He carried out the ideas of Head and Bunting and has been successful in hardening poorly calcified teeth. I have been using his method for about four years and have had excellent results in a number of cases. My application of this method has been more in the attempt to harden soft, caries-ravaged, sensitive teeth, and in this connection I have had marked success.

Andresen* advises the use of his newer powder having the following ingredients:

℞

	Grams
Tartaric acid	448
Solution of gelatine 10 per cent	50
M. et ad	
Precipitated phosphate of calcium	
Precipitated carbonate of calcium	
Basic carbonate of magnesium ana	160
M., sic. et ad	
Bicarbonate of sodium	560
Chloride of natrium	160
Corrigents of taste ad libitum	
M. d. s.	
Effervescing, mineralizing Anticarieticum.	

The principle to be followed in the attempt to recalcify or remineralize white spots in dental enamel is to have this powder dissolved in the saliva which penetrates into the more porous areas. The patient is therefore instructed, after thoroughly cleaning the teeth at night, to apply a small quantity (about one gram = 16 grains) to those areas of the teeth to be treated and to retain as much of this powder in the mouth during the night as possible.

A more intensive method of application is to use a tin foil which has been coated with an albuminous powder on one side ("dry foil"). A paste of mineralization powder is applied freely to the inner surface of the tin foil which is then placed over the affected areas; the foil is thoroughly molded with thumb and forefinger in close adaptation to the surrounding teeth and gingiva. In this manner, a more concentrated effect of the powder is achieved.

The principle involved in changing white, opaque spots in the enamel to their normal translucency is simple. The applied paste, composed of mineral salts, penetrates into this porous area, filling the minute spaces and again joins the individual enamel rods; thus the white spot disappears.

I am, however, convinced that the treatment of white spots from the exterior is a mere makeshift. I believe that the natural process of furnishing the enamel with sufficient mineral matter is from the interior, i.e., by way of the pulp. The tendency to form white spots in the enamel appears to be an idiosyncrasy of certain patients. Whenever this occurs, the orthodontist will usually observe that the patient is not in a particularly robust and healthy condition.

When these white spots do appear on the teeth of the patients, it is best to start the local treatment with remineralizing powder immediately and to suggest a consultation with the family physician. The application of this powder must continue for at least three to six months and, as can be imagined, the conscientiousness of the patient is the principal factor in achieving results by this means of remineralizing white spots in the enamel.

*Andresen: The Physiological and Artificial Minerialization of the Enamel, Oslo, Einar Dancke.

ETHICS*

By W. A. Bryan, M.D., F.A.C.S., Nashville, Tenn.

THE guide to the conduct of professional men in their relations to their patients, which, in final analysis, is the public, and to fellow members following the same calling is ethics. The various items constituting the details of professional conduct, when systematized, is the Code of Ethics, about which little will be said in this discussion, because changing conditions and circumstances and varying human relations together with the manner of life of the community in which one lives and practices must inevitably alter the details, if not the words, of application of any code. The laws of traffic have been modified in practice with changes in the mode of travel. Men who fly and ride automobiles may be compelled to do so under laws written by legislatures which assembled in oxcarts and buggies, but either a new interpretation of these laws is enforced or an organic change in the laws themselves is made. The principles of the laws may be the same; the details are ludicrously different. "Hit and run," speed limit, road-hogging, signals for right and left and stop, passing others where clear vision of the road cannot be had a hundred yards ahead, maintaining an elevation of two thousand feet above the tops of buildings and avoidance of looping the loop, tailspins and falling leaves when travelling over thickly settled territory would be very just and at the same time very foolish laws for a country or a time where and when the motive power of travel is the plodding ox. One might wisely ask if they are more foolish than motoring or flying under laws applicable to cattle-propelled vehicles. Again, the Code of Ethics lays down certain drastic details for the conduct of physician and dentist when his brother practitioner needs his services. Who was his brother? Who is his brother? The code calls for services without charge. Is this item to be continued in the code without modification? Here is a fellow who sends all his referred work to some one else for reasons of his own, but when he and his dependents need service he comes to you. The code contemplated visiting your neighbor in the same town or county; now you are likely to be called across states to visit neighbors you never saw. In the ox days your brother was a man near you in space and could be reached at little cost; today he is the multitude of your profession in this nation. The details of ethics is too extensive, too complicated. Hence a review of the principles of ethics is all that can be condensed into a brief discussion.

The author of the sentence, "Do right and fear no man; don't write and fear no woman," was able to summarize almost all of ethics in the first clause; what he missed in the first he garnered in the second.

*Read at the Twenty-ninth Annual Meeting of the American Society of Orthodontists, Nashville, Tenn., April 8-11, 1930.

It may seem a bit unprofessional to say so, but is true, that ethics has as its prime consideration the welfare of the patient. There can be no doubt that professional men have looked at the other side of this statement so long and been entangled so long and so frequently with the painful incidents of a busy life that they, whole groups, whole professions of them, have convinced themselves that the first consideration of ethics is the profession. Yet any student of the meaning of a profession, of the meaning of ethics, and the *raison d'etre* of each cannot long withstand this conclusion, but must be driven soon to the corollary that practically all of the code pertaining specifically to the relation of doctor to doctor is necessary not on account of the needs and comforts of the doctors but because the public welfare requires it.

It is the duty of those who treat human ailments to know the field of medicine in a general way, to perfect themselves to the limit of their capacity, mental and financial, in the special field of work to which they limit their practice. This statement implies a great deal that some of us are prone to forget. Constant changes are being made in practice, sometimes for the better, at others for the worse. These changes are announced in journals, discussed in societies, demonstrated in clinics, to all of which all members of the profession have easy access. What of the man who fails to avail himself of such changes in the practice of his profession? Is he honest? Can he decide whether some particular change in practice is better or worse? Does he put himself in position to give his patrons the benefit of an honest, well-considered conviction that the new plan is better or worse than his usual practice? Or is he a changeless fossil bound to and buried in the learning and the lore of the past, a scientific anachronism oblivious to all progress? Is such a man a good man? Is he safe? No matter what this man's position among his professional brethren is, he fails to deliver to his patients what is best and fails because of his own dereliction. The law does not consider such practice competent, and when we come fully to our senses, it is doubtful whether such a man is ethical in any sense of the word.

The fact that disease exists is the only excuse for the existence of either doctor or dentist. An attempt has just been made to show that the professional man must equip himself to do the best of work. Now we are all squeamish about advertising. We do not do it. Yet we meet privately and behind the cloistered doors of our associations lament the kind of poor work the average man receives at the hands of his dentist, and are perfectly correct about it, while both this dentist and patient are deluded with the belief that the work is excellent. Then you shed tears over the enormous number of mouths that have no professional attention at all. You consider with horrified gravity all the near and remote pathology that may arise from bad teeth and bad gums, from focal infection to cervical adenitis: and the result is no more than the standard benefit obtained by those who must have a spell of crying. We feel better and remain normal and happy until the next meeting, and the same unfruitful spree is enjoyed again. This has been going on to my certain personal knowledge for a third of a century. I have the impression that it has been handed down since memory runneth not and can easily imagine Galen and Esculapius throwing fits of abdominal pain about

the poor service and bad results of certain of their contemporaries. What is the matter with us? Honestly, what is the use of the profession's having all this skill and knowledge and love of humanity, and then running like a hare before the hounds as soon as some one suggests making such knowledge public. They shy at publicity, at advertising. I know what Emerson said about the man in the woods with the mousetrap. That may be good philosophy, but it is very poor business. I have known men who had better stuff than a trainload of mousetraps to sit in their offices until starvation came, and nobody ever made a path or a track to their house. This theory is all right if it would work, but it will not. How do you gentlemen happen to be wearing B.V.D.'s and Boston garters today? It is the result of advertising, which is nothing more than a publicity campaign. The articles of apparel mentioned have flashed into our eyes in so many magazines that when I go into a store to buy garters and they ask me "What kind?" I can think of no other but "Boston." How should I have ever known that such an article existed otherwise. It would not be nice to ask the gentlemen I meet on the street to pull up their pants and let me see if they wear garters and, if so, what kind and how they are pleased with them. Still, I dare say, it would be quite as proper as investigating the possibilities of dentistry by the same plan.

If any of you are beginning to feel bad, I may help you by saying that I am not talking of individual advertising, but of the dentists', the orthodontists', the physicians' systematically and persistently putting certain necessary facts before the public in order that the people may know that these conditions can and should be treated, and what the consequences are if neglected. Now, if these professions are not big enough to let the public know these essential facts, we may be ethical with relation to each other, but we shall have dealt the public, our patrons, the heaviest, hardest blow within our power; and one day when we least expect, this same public, realizing our dereliction, will establish state medicine and instruct their hired doctors what to make public and how to do it. The public welfare requires it, and the public is the first and chief consideration of ethics.

Let me illustrate two points at once, namely, the value of publicity and that this generation of youngsters under thirty-five years of age is different from its elders. The American Medical Association and the American College of Surgeons have undertaken publicity, especially in regard to cancer. A few weeks ago two women came to my office. One of them was sixty-five. She had a hopeless mammary cancer. On inquiry, she said that she discovered it more than a year ago, and that a chiropractor had been treating her all that time. Well, he could not somehow get hold of the right bone, or could not get it adjusted. The cancer kept growing as the result of two ignorant people avoiding the only thing that offered any hope of saving a lovely life. The other woman was thirty. She had found a tumor in her breast the night before seeing me. She was told that it was a tumor and should be removed and examined microscopically; that, if it were malignant, a radical operation would be necessary. She asked if I could do the work the following day. This latter woman knew something from some source, knew enough to give herself the best chance to live a normal span.

These younger people are educated. They know their business and expect us to know ours and to give them enough information, from time to time, to enable them to act in such a manner as to give the greatest assurance of life and health. They are going to have this information ethically or unethically, and ethically were better; but have it they will, voluntarily or by duress. They are different, more than we realize unless we come into intimate contact with them. They know that a hen cannot lay an egg unless she has something from which to make it; that sweet clover and alfalfa will not grow without lime and inoculation. They are in the habit of finding what and why, and when, and have well acquired the habit of going to authorities for their information. They are better trained than we were; they are just plain better than we were, the noblest and the best so far created. Shall ethics do its duty by them?

Let us pause a moment and think, take our minds from our laboratories of research long enough to orientate ourselves. Our automobile has stopped running. What do we do? The reasonable man calls a mechanic who investigates the car, locates the trouble and corrects it. If the Frigidaire stops working, what do we do, knowing nothing of the mechanism? Everybody knows what to do. Manufacturers have seen to that by the same method employed to sell them, namely, by letting the public know. If the radio ceases its noise, everyone is miserable until the "radio man" is called to inspect its numerous and delicate and intricate vitals and restore them to normal function. What do the people know of the infinitely greater intricacies and niceties, anatomy, physiology, pathology, function, normal, perverted or lost, of dentures, prosthesis, orthodontia, surgery, in and of themselves and in their normal and abnormal relationship to the remainder of God's master mechanism, than we know of radios, Frigidaires and automobiles. There is a difference. These cease to run on small disturbances. The human frame in its wonderful and complicated structure will run on and on with minor disturbances till the process extends to a hopelessly irreparable state. Yes, we owe the public something just here, and we ought to begin to pay it.

How can the public tell a good doctor or dentist from a poor one? How would you tell? Too often it is decided by the amount of bragging the doctor does, by the appearance of his outfit, his automobile. The symbol of a good doctor when I began to practice was a nice, new, clean microscope under a bell jar in the front window. Today, it is a much used, dingy, shabby-looking microscope in a back laboratory where it is put to use. How should a layman know his sore throat is trench mouth and of its consequences? What do the people know of lymph nodes enlarged in the neck, of their causes and consequences? It took us till the twentieth century to know; still we do not know all. Everybody knows that kernels may come in the neck, remain a while and disappear innocuously. What they do not know is that lymphsarcoma, carcinoma, Hodgkin's disease, tuberculosis, leucemia, an infamous group for which no match can be found in any other easily accessible part of the body should receive early attention. And the people, our people, do not know, and cannot unless we tell them by the only available method, namely, the press. The radio might help it, were there time. In one country, I am told, the uni-

versal remedy is vodka: in numerous localities the universal treatment of mouth and teeth is extraction. Sometimes it is better, at that, than what else they get. Sixty million people in the United States have no treatment of their mouths, many more millions receive inadequate treatment. Who are we to sit aloof and see this thing drag their bodies down to disease and death? Dead men made this code of ethics: shall we not be as great as they, and read into it, write into it such changes as our times require?

That side of ethics pertaining to our relations to each other is better known, better followed, for we do sometimes find a man who is ethical in his conduct toward the whole profession, and frequently those who are noticeably so to their friends and to the members of their clique.

If one were to get the private opinion of the first hundred dentists or orthodontists one should meet, of each and every one of you, it is probable that you would not show up so well as you individually think you should. Let me say that bickerings and criticisms do not get you anywhere at all, usually not even with the man into whose ears you pour the condemnation of your confrere. Is his work bad? To be sure. Is yours *universally* good? Remember the greatest of that great trio of virtues, "faith, hope, charity." Criticism of other good men helps no one, the critics least. It puts us in bad light with the public, makes them skeptical of our integrity, renders it more difficult to do the great work of publicity on those things universally accepted, which were suggested in the earlier parts of this paper, makes enemies, causes hearts to ache, does nobody good, and frequently is the foundation stone of damage suits. Almost every damage suit has some other doctor, purposely or unwittingly, behind it. Besides, if you are bound to have an enemy, the worst thing you can do to him is to refuse to talk.

There are details in the professional side of ethics, but the principle is to be found in the one priceless gem of human conduct, "Whatsoever ye would that men should do to you, do ye even so to them." Think of this—then talk.

DISCUSSION

Dr. Lloyd S. Lourie.—It is a good thing for us occasionally to have our attention called to our ethical obligation to one another and particularly to our patients. Concentration upon making a living and upon the so-called practical and research problems seems sometimes to cause us to forget that our first obligation is to benefit our patients and that in this respect we are engaged in something more than a business, a trade, or an art.

I think that Dr. Bryan has wisely avoided any attempt to apply ethical principles in detail to controversial situations which develop in private practice. He has given two general rules which should amply cover these things and has directed our attention to some larger problems of our group responsibility to the public. The two rules to which reference has been made are: first, to treat the patient and the other orthodontist as we should wish to be treated under similar circumstances, and second, that if there should be a confliction of interests, the rights of the patient should come first. Dr. Bryan states that "it may seem a bit unprofessional" to say this about the prime consideration being the welfare of the patient. unfortunately too many men feel that they should be shielded from criticism and should not criticize others under any circumstances, forgetting that the good name of the profession and the welfare of the patient demand that malpractice and particularly dishonesty should be exposed and discouraged.

A good point is made by the essayist in stating that a man is not ethical who does not keep informed as to progress in his profession by reading the journals and attending meetings where advances are discussed.

Both the medical and the dental professions are awakening to the consciousness of their group responsibility to the public, and orthodontists must fall in line and plan for extending the benefits of orthodontic treatment to the vast number of individuals who at present have no chance of obtaining such service. Dr. Bryan has suggested that unless the professions themselves plan such extensions of their services they may be confronted with state medicine and dentistry. I believe that this might be a fine thing, although most members of these professions get alarmed when it is proposed.

Dr. Bryan's suggestions as to using the press for educating the public on health matters brings to mind the fact that we now receive cooperation from that agency.

THE BEST AGE FOR ORTHODONTIC TREATMENT*

By Dr. Else Levy, Hamburg, Germany

THERE has already been so much said and written as to the most favorable time for beginning orthodontic treatment, that it seems rather idle to take it up once more. In the laity you still very often hear the opinion expressed, and formerly generally accepted, that treatment should not begin before the age of twelve years. Therefore very many patients, through ignorance, allow precious time to pass and often extreme anomalies arise, which might have been easily corrected prophylactically. But also in the scientific literature the opinions about this matter are very much disputed. An essay published in the International Journal of Orthodontia, Oral Surgery and Radiography showed me how confused, and above all unproved, are the opinions as to the best times for beginning orthodontic treatment and this caused me to speak about this theme.

In the December issue of the International Journal of Orthodontia, 1927, an article by Dr. Frank Gray, San Francisco, was published dealing with the question whether there were certain cases of malocclusion where orthodontic treatment would be contraindicated. Starting from the point of view that in each orthodontic practice there are a number of cases with unsatisfactory results, the author tries to investigate the causes for such failures in order to avoid them. For this purpose the author has applied to the well-known orthodontists of his own country and in England, with the request that they give their opinion on ten questions he asks. The results of this circular have been published. The first question asked by Dr. Gray referred to age as a limiting factor, which included the limit of age upward as well as downward. The practitioners whose opinions the author asked were among the best reputed in orthodontia, as Rogers, Boston; Lockett, London; McCoy, Los Angeles; Pullen, Buffalo; Ketcham, Denver; Chapman, London; Hawley, Washington; Lischer, St. Louis, etc. The answers of these authors show a great variety of opinions. But all of them agree that the same anomalies are to be found in the deciduous teeth as well as in the permanent ones and that early regulation is preferable to late correction. But the idea of "early treatment" is very differently interpreted by them. Fourteen out of twenty authors, that means 70 per cent, are against a treatment of anomalies before the age of six years, very few consider the age of five as favorable, but without giving detailed arguments, only six out of twenty, that means 30 per cent, are of opinion that orthodontic treatment should begin as early as possible.

McCoy, Los Angeles, is of opinion that only those cases justify an early beginning—that means before the age of six—in which there exists an extreme anomaly. McCoy asserts that these cases are extremely rare in any

*Read at the 1929 Congress of the European Orthodontological Society.

practice. As to my personal experience I can only say that these cases are not at all of rare occurrence in an orthodontic practice, and I want to demonstrate this with a few examples. I want to stress that this is not at all selected clinical material, but private patients who happen to come into an orthodontic office any day.

The first patient, a little girl, came into my practice at the age of three, only to accompany her elder sister who was under treatment. I then succeeded in making a photostatic photo of her (Fig. 1). On the photograph you will see the strongly pronounced retraction of the mandible, the receding chin, a well-known and typical picture which makes the patient look stupid. I should have liked to begin the treatment at that time, but I did not succeed in convincing the parents of the necessity and value of early treatment. It was two years later when the parents came again with the

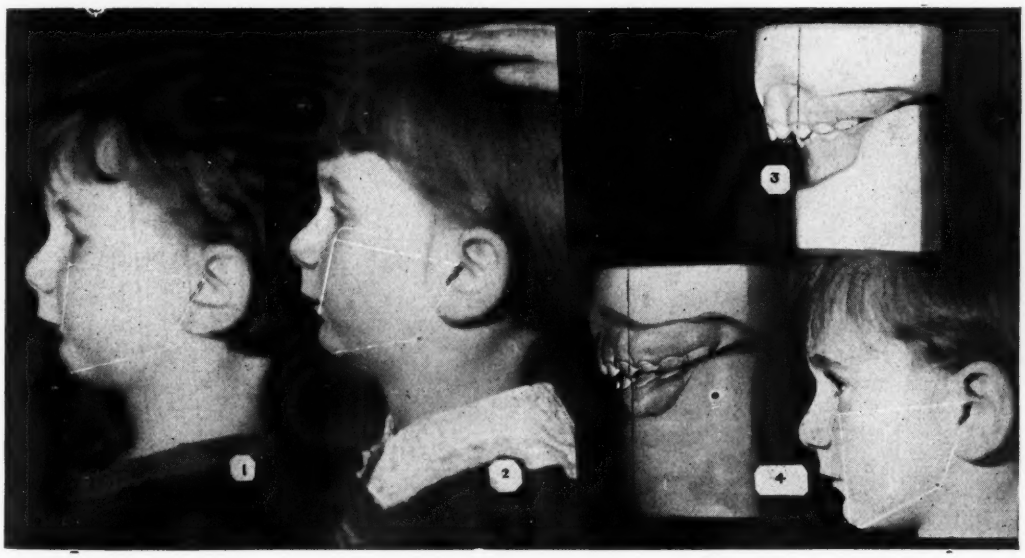
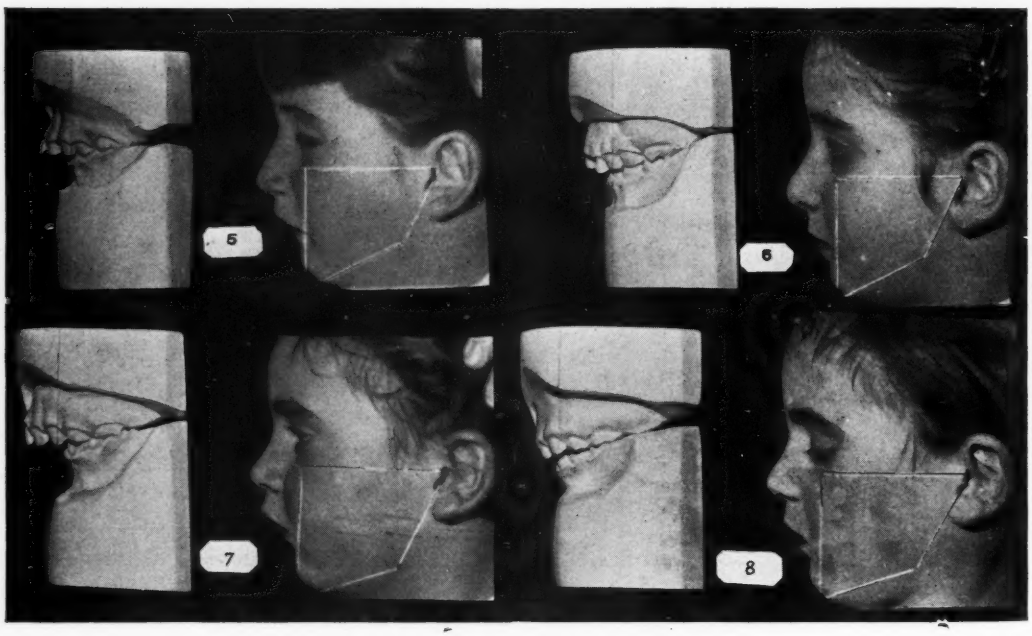


Fig. 1.—Photograph taken in 1924.
Fig. 2.—Photograph taken in 1926.
Fig. 3.—Model made in 1926 (with lines).
Fig. 4.—Model made in 1927.

child to my office. The photograph which was taken at the age of five shows the same picture (Fig. 2). The condition of the denture is shown by Fig. 3. There was a contraction not very marked in both jaws, in connection with the strong retraction of the mandible. Thereupon the parents were convinced by the two photographs that the condition in itself would not improve in the least, they agreed to treatment, which had to start at once and was performed without the least difficulty. The patient wore only an expansion arch in the maxilla and after a short duration of treatment was instructed to perform the muscle exercise (Rogers') which she did conscientiously, as I convinced myself. Impressions and photographs taken about three-quarters of a year after the beginning of the treatment show the condition at the moment (Fig. 4). The improvement of the features, as is visible in the photograph, is very conspicuous, and I do not agree in the least that when there

is an anomaly as disfiguring and disturbing as this one, I should wait until the child is six years old.

The age of six years, which, as I have seen from the answers of the circular is considered by most of the orthodontists as the best starting point for early orthodontic treatment, is an age I do not think favorable, if merely for practical reasons. At six years old children begin school. Sitting still so long, which they are not used to, and the task of concentrating their minds, are a tax on the body and mind of the child and surely exhaust them a good deal. The beginning of orthodontic treatment will also upset such a young child, the slight inconvenience of the appliances in the mouth, felt as something strange, must be added as well as the small hindrance when eating. There is, in short, a number of factors which seem disposed to diminish the resistance of the child's organism. It does not seem, therefore, very reasonable to allow this



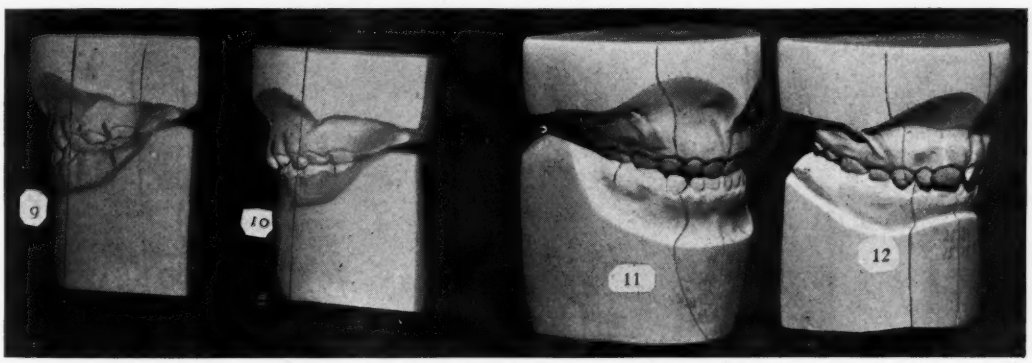
Figs. 5 and 6.—Before and after treatment.
Figs. 7 and 8.—Before and after treatment.

temporary combination of these two inconveniences. It never happened to any of my many little patients, as is asserted by the adversaries of early treatment, that the children did not possess the mental strength to stand the treatment. The chief point is to touch their sense of honor and to win their interest in the treatment. Therefore, it is ever so much better to have the treatment begin before school, even finish it if possible. My cases of very young patients, my youngest patient was three years and a half old, were very successful. After a short time when the first horror of treatment is overcome, the patients have a great feeling of satisfaction, as they produce the results with relatively little trouble.

Especially interesting was the case of a little girl (Fig. 5) who at the age of four years was not able to masticate at all, so that she had to be nourished only with pappy food like a suckling baby. The child was con-

tinuously under treatment of a specialist, but no medical art was able to make her eat solid food, which was perfectly comprehensible to me when looking at the condition which the denture showed. After a short duration of the orthodontic treatment, consisting in the expansion of the maxilla and muscle exercises, laziness in mastication was overcome. Besides this the treatment produced an astonishing success on the general constitution of the child, who, when coming first into my office, gave me the impression of an individual rather backward, both mentally and physically. In connection with the improvement of the laziness in mastication, the general development of the child progressed quickly. On going to school, the child was quite up to average and perfectly satisfied the demands made on her. An impression and photograph taken then show the condition of the denture and the features at that time (Fig. 6).

For less weighty, but yet justified reasons, the parents came into my office with their daughter, four years of age (Fig. 7). In this case it was concern for appearances which determined the parents, and it cannot be



Figs. 9 and 10.—Before and after treatment.
Figs. 11 and 12.—Before and after treatment.

denied that the very pretty child was extremely disfigured by the marked anomaly. It was unknown to the parents that these anomalies have an unfavorable effect on the general constitution, therefore, it must be noted as a fortunate circumstance that these anomalies are disfiguring, because it is this reason which very often causes the parents to bring their children for orthodontic treatment. The chief point in this case was also a mandibular retraction; the treatment consisted, as with the former patient, in the expansion of the maxilla and muscle exercises. The success satisfied the parents very much. (Fig. 8.)

But we also find less extreme anomalies with these young patients which nevertheless need urgent correction, for example, the case of a little girl, four years of age (Fig. 9). The front teeth of the maxilla occluded lingually with the mandibular teeth. It goes without saying that this has very unfavorable consequences for the maxilla which is retained by the mandible like a bolt and is restricted in its further development. This case created some difficulties at first, as I wanted to avoid opening the bite. With a lingual appliance, which I thought especially apt for such cases, I did not succeed,

as the resistance opposed by the mandibular teeth was too strong. But with the help of the spring-beam apparatus I succeeded in bringing the maxillary teeth forward and in establishing faultless occlusion, as is shown in Fig. 10. In this case and also in the following one it is very important to interfere as early as possible in order to avoid false development of the jaws.

With the little patient (Fig. 11), five years old, there was a unilateral contraction in the maxilla. The front teeth had just the right overbite; but beginning from the right canine the teeth of the maxilla were standing in lingual bite. I used the spring-beam appliance after Simon, on the left side a long beam running up to the incisors was taken, to strengthen the resistance of the correct side, so that only the right part of the maxilla was expanded. The treatment progressed rather quickly so that it was finished

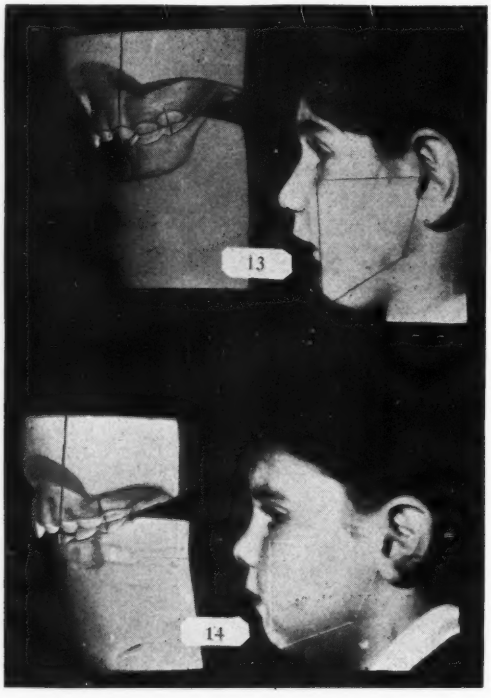


Fig. 13.—Before treatment.
Fig. 14.—Before treatment.

when the child had to go to school. The permanent teeth afterward erupted in the right position, as is shown in Fig. 12.

If there are special reasons, as for example, extreme delicacy and weak constitution, I defer the beginning of the treatment, but I always try to fix the condition of the denture at the time I first see the child by an impression and a photograph, as regular series of impressions of one patient represent an excellent material for learning and teaching. The patient in Fig. 13 was not yet four years old when she came into my practice. In this case also there was a contraction in both jaws, and as the photograph shows distinctly, a marked retraction of the mandible. As the child was extremely delicate and the specialist who treated her, and with whom I spoke personally, was doubtful about an immediate orthodontic treatment, I gave it up for the

moment. I only recommended the mother to make the child leave off sucking, though I do not anticipate great success of it, and asked the mother to come again in half a year. I hope to be able to report on a later occasion about this case, as well as about the case of the little patient three and a half years old (Fig. 14), whom I have already taken under treatment, but whose treatment is not yet finished.

As I have shown, I see no impediment to early treatment in very young children, for a few years later, when the teeth are changing, from about nine to eleven years, there comes a period where I do not consider an orthodontic treatment indicated. With almost every anomaly there exists a more or less pronounced contraction. If the deciduous molars are already absent, or if their roots are so much resorbed that they no longer influence the succeeding permanent teeth, a treatment would be useless, as a sufficient lateral expansion cannot be attained at that time. In this case I think it more practical

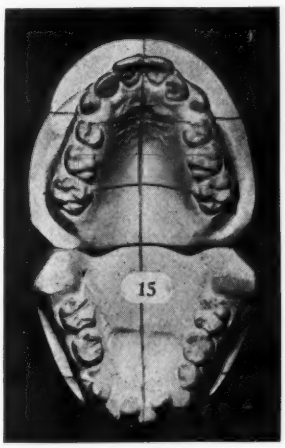


Fig. 15.—Occlusal view of models.

to defer the treatment until the denture has changed entirely, to prevent the patients from wearing appliances in their mouth for years without use. A certain year cannot be fixed, the times of eruption being very different individually. Generally the deciduous molars and canine scarcely begin to change before eight or nine years, yet with one little patient seven years of age, I found all the permanent premolars erupting, while on the contrary with the patient fourteen years old (Fig. 15), all the deciduous molars were still present. An x-ray photograph was also made which showed that all the permanent teeth are there, further that the absorption of the deciduous roots had already advanced so much that one could count on the eruption of the permanent teeth in the near future. The long delay in treatment of this case depended upon the erroneous assumption of the parents that one could not regulate before all the teeth had changed. In the meantime the patient has become fourteen years old and about one year must pass before a treatment can be thought of. Thus the patient will be fifteen years old at the beginning of treatment and sixteen to seventeen years old when it will be finished. It goes without saying that a treatment at that age means much more incon-

venience to the patient than in the time before school, also that the most favorable time as to the transformation of bone has been lost. As the times of eruption of the permanent teeth are so variable I have an x-ray photograph of all the patients at about the eighth year of age and let the beginning of treatment depend upon its findings.

Should there exist any other great anomalies together with the contraction, needing immediate treatment, this can of course be done at that time, even if the contraction must stay without treatment.

Maybe the prejudice against early treatment which used to govern the opinions and partly does now, depends greatly upon insufficient diagnosis. It is well known that Angle designates "the upper first permanent molars as the keys of occlusion," and that he bases on their position and on their relative relations, the classification and diagnosis of the anomalies. As the first permanent molars generally do not erupt before the age of six, all the anomalies that are evident before, do not come within the reach of systematical diagnosis. It may be that for this reason until now, the age of six years has been considered as the most opportune period for early orthodontic treatment. But this difficulty is overcome now by the three-dimensional-way of consideration, for diagnosis based on gnathostatics shows that not one tooth only should be taken as starting point, but the whole denture must be considered in relation to the skull: it is quite immaterial if there exists an anomaly in the permanent or in the deciduous denture. In each case we are able to find out the right diagnosis.

In conclusion I want to sum up with a few words. Each anomaly as soon as it can be diagnosed needs proper treatment. In the very young age the conditions as to the density of bone are very favorable and insure a safer result than later on. The time of the denture's change shortly before the eruption of the permanent teeth is not practical, regarding the treatment of contraction found with nearly any anomaly. On account of the variability of time as to the eruption of the teeth, it is advisable to have an x-ray photograph before the beginning of each treatment during the time of the denture's change. The difficulties which Angle's classification opposed to diagnosis of deciduous dentures exist no longer as shown before.

So it seems a matter of fact today, what Bogue already claims in his "Principles of Modern Orthodontia," published in 1916, that each child from the third year of age should be thoroughly examined by a dentist, and not only with regard to the condition of the teeth but also to the form and position of the arches. I want to add the claim that each anomaly as soon as it has been recognized must be treated immediately.

THE SURGICAL CORRECTION OF AN EXAGGERATED CASE OF INFERIOR PROTRUSION*

By H. G. Watkin, L.D.S., and G. C. E. Simpson, M.B., B.Ch., B.Sc., F.R.C.S., London, England

THE case I am presenting is that of a patient aged twenty-eight years who was sent to me by a colleague for consultation.

Fig. 1 shows the extreme condition of the malocclusion.

The mandibular incisors are 19 mm. anterior to their normal position with relation to the maxillary incisors. When this photograph was taken, great care was exercised to make certain that the mandible was not protruded.

Fig. 2 is an oblique view with the jaws closed and the lips opened to show the teeth.

Fig. 3 is a side view of models of the mouth mounted on an articulator.

Fig. 4 is a front view of the same. It will be observed that there are only two points of occlusion between the maxilla and mandible, viz., at the back of the mouth, and that the maxillary arch is smaller and inside the mandibular arch. The tongue is entirely inside the mandible.

Fig. 5 shows the mandibular model placed in the best possible occlusion with the maxillary model.

Fig. 6 shows side views of the same.

Fig. 7 illustrates a silver splint which was made. It took the form of two continuous caps to fit the crowns of the teeth of each jaw. At suitable positions hooks were placed to enable the two jaws to be wired securely together. These caps were cemented in position the day before the operation, and in arranging the new occlusion the molars were gagged to the extent of about 3 mm. more than the incisors.

The surgical part consisted of sawing through each ramus at a point just above the dental foramen. The angle at which the saw-cut was made was considered important because to get the teeth into the best occlusion the rami required lengthening, and this could be achieved by making the cut from before backward and downward.

Fig. 8 makes this clear. A horizontal cut makes the ramus the same length after the operation as before, an oblique cut makes it either longer or shorter as desired.

As x-ray negatives projected on the screen show very badly, I have made an outline sketch of one side after the operation—the other side is very similar. (See Fig. 9.)

The splints were removed after six weeks, during which time the patient was fed on liquids sucked through a glass tube suitably bent so that one end protruded into the mouth through a gap caused by a lost molar.

*Transactions of British Society for the Study of Orthodontics.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

After the removal of the splints it was found that in spite of the previously arranged excess gagging in the molar region, the incisors would not meet.

Fig. 10 shows this.

It was obviously necessary to remove two of the posterior teeth. The

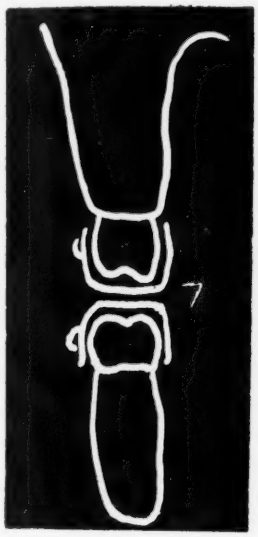


Fig. 7.

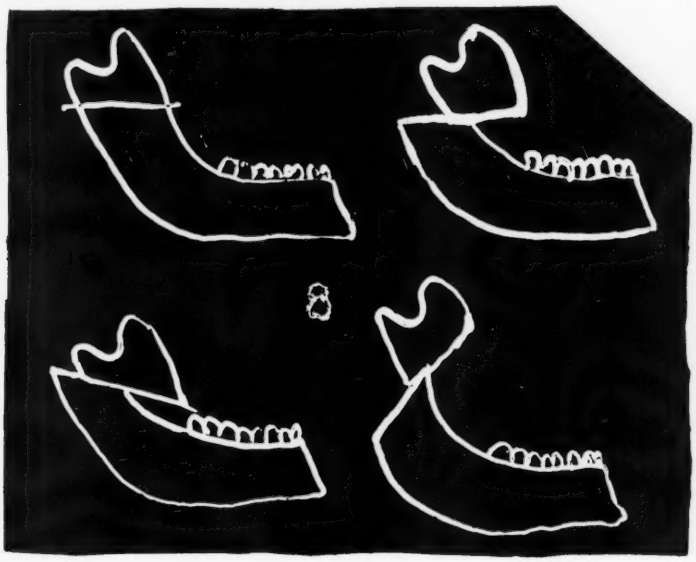


Fig. 8.

Fig. 9.

maxillary third molars (one of which was rudimentary) were extracted, and a little of the tuberosity of the maxilla was removed.

After the use of articulating paper and a little careful grinding of the teeth, the incisors were enabled to meet, and sixteen teeth are now in occlusion as shown in Figs. 11, 12, and 13.

The load of the bite was thus distributed and periostitis avoided. The patient was asked to bite the operator's finger, and this could be borne with-

Fig. 10.

Fig. 11.

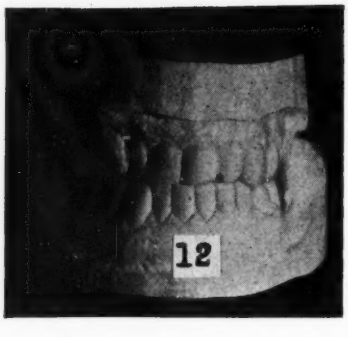


Fig. 12.

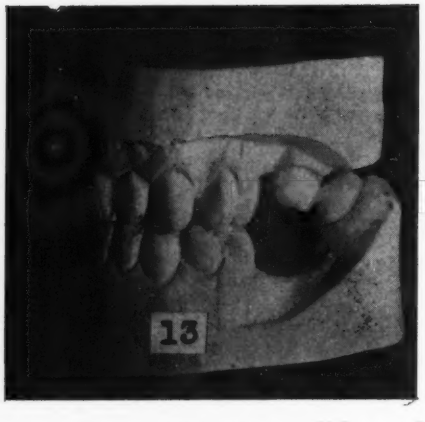


Fig. 13.

Fig. 14.

out much pain—showing that the muscles were rather weak. A simple form of jaw exercise was given, viz., to chew chewing-gum and after three weeks the patient remarked with a smile, "*Now* let me bite your finger."

This offer was wisely refused—the operator inserting instead a thick strip of rubber which it was found impossible to remove as long as the patient was biting.

There was complete anesthesia round the front of the mouth anterior to the mental foramina, but this was considered to be due rather to the stretching of the dental nerve than to its division, and there are now signs of the return of sensation.

When the jaws were first released from the splints and the patient found he could open and close his mouth with comfort, he nearly collapsed with the shock of joy. It was noticeable that his speech was at once improved and is now normal.

Fig. 14 shows the patient's present appearance.

(Mr. Simpson gave the following account of the surgical operation:)

In subcutaneous osteotomy of the mandibular ramus, a point on the posterior border about the level of the center of the lobule of the ear should be above the facial nerve and dental foramen. The anatomy should be checked by x-ray photographs, however, owing to the unusual obliquity of the ramus.

A fine tenotome is entered at the chosen spot and pushed on to the posterior border of the bone. A small periosteal elevator is passed along the tenotome before the latter is withdrawn and the periosteum of the deep surface of the mandible raised for the whole width. The saw is passed along the elevator and the bone cut from within outward.

When the cut is well into the bone, the final separation may be hastened by the use of a small chisel. In the case described we were agreeably surprised by the ease with which the periosteum separated.

I feel sure that on both sides we were on bone and above the dental foramen, but in spite of this there was anesthesia—the explanation is probably due to stretching of the nerve by the displacement required in this case—the overlap on one side as shown by x-ray was only about one-third of the cut edge.

Mr. Simpson added that he wished to acknowledge that the point was to him a most interesting one in surgery, and he was very much pleased to be allowed to come to the meeting to support Mr. Watkin. He did not think Mr. Watkin had by any means made the most of the case, because having a somewhat natural anxiety about the possibility of nonunion, he had himself inquired from the patient, who was prepared to take the risk since he could not eat in public. His mouth was so bad that he was really ashamed to take a meal in front of anyone, and in the profession he was adopting it was rather important that he should be able to do so.

I would like to place on record my thanks to Mr. Simpson for his kind and able cooperation. We derived some help from a description of a similar operation in *The First International Orthodontic Congress*, New York, 1926, page 245, "The Surgical-Orthopaedic Removal of the Deformations of the Jaws," by Christian Bruhn, Dusseldorf, Germany.

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DISCUSSION

The *President* remarked that the teeth being in such good condition seemed to show how much the lack of function was overstressed as causing disease, and asked if the extraction of the maxillary third molar and the grinding were done at the time the splints were ligatured together or at a subsequent operation.

Mr. Watkin said this was done after the splints were taken off. No gagging had been anticipated. He thought the gagging was due to the fact that the two parts of the jaw that were cut away would be slinging on the attachments, on the cheek ligaments, and would not be held up tightly, so that when the patient could close his mouth and the muscles put pressure on the back, they were naturally shorter there than was anticipated, although 3 mm. were allowed for that. He would allow 6 mm. next time. This, however, proved rather lucky in the end, because much better occlusion was obtained on the right side. The posterior molars were of very little use in any case.

Mr. Steadman congratulated the authors on the very brilliant operation they had described. He would like to know more about what happened to the dental nerve. In pushing the body of the mandible back, was the nerve merely stretched or was it actually torn? It seemed possible that the distance that the larger fragment had to be pushed back was so great that the nerve might have been severed. He desired to express his admiration for the careful way in which the operation had been planned, and he thought it would encourage others to try it. Fortunately, such cases were very rare. One of the points which had impressed him most was the very small external cuts that had been made. Such an operation would not disfigure any patient.

Mr. N. Gray said he desired to ask Mr. Simpson a question. In Philadelphia he had seen a similar case, and in exactly the same way the teeth were splinted, and bands were made and cemented to the teeth before the operation. One point that had interested him was the type of saw used—just like an ordinary fret saw, only longer, and a needle was first threaded through the tissues, very carefully led round the bone, and the saw pulled through by it. The surgeon had cut right through in a few seconds with a to-and-fro motion. It had struck him as simply a fret saw blade.

Mr. Simpson said he had thought of the Gigli saw in case of difficulty, but there are several objections—instead of having one cut only, two were needed. From his knowledge of those saws they often broke. They had to be kept true. It was most awkward unless one had a grooved guide to keep them right, to prevent their ragging the tissue.

With regard to the foramen, on one side he was not sure he was very much above it, but on the other side he was quite sure he was above it; it seemed to him that with that enormous displacement backward, nearly three-quarters of the width of the mandible (judging by the x-ray photograph—he would have thought it was more than the 19 mm. mentioned by Mr. Watkin) there must be a tremendous pull on the nerve across, and the fact that sensation was returning seemed to show that it was probably a nerve stretch rather than a nerve cutting.

Mr. Watkin said if the operation was possible for a prenormal occlusion, it must be that there were many possibilities for doing the reverse operation. If a patient came along

with no chin, he did not see why they should not give him one. The cut could be made at a predetermined angle and the jaw splinted accordingly.

Mrs. Lindsay asked what was the present shape of the ramus, and whether it followed the usual laws of growth, absorption and deposition, and what happened to the posterior rim of the part that was pushed back—was it moulded back into line again, or did it project backward?

Mr. Watkin said it projected backward, but there were signs of callus all round the junction. As a matter of fact, the patient rather unwisely had gone to the skating rink, and had fallen over and had several knocks on his jaws, without any trouble resulting.

Mr. Highton said he could not criticize the surgical side, but he had been interested to see that the teeth appeared to be in a good condition, in spite of the fact that before the operation there was no occlusion.

The Hon. Secretary *(Mr. Packham)* said he wanted to thank Mr. Watkin and Mr. Simpson very much for showing the case. He had made one or two notes, and it was curious that he had thought of exactly the same thing as Mr. Watkin had just mentioned—how useful

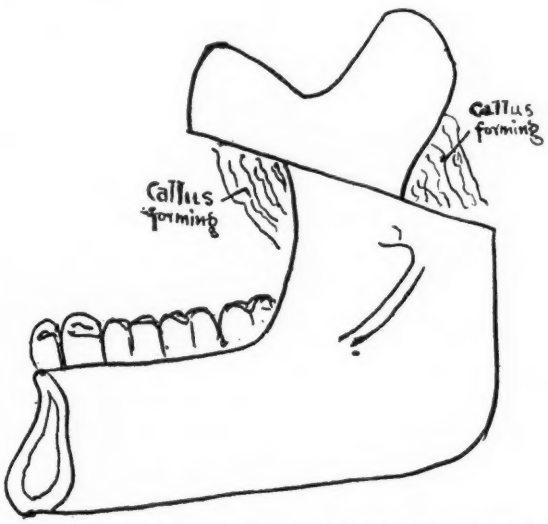


Fig. 15.—Diagram made on the blackboard during the discussion.

it would be if one could only treat the postnormal cases in the same way as he had treated his prenormal case.

He desired to ask Mr. Watkin as to the man's voice—whether it was affected, and to what degree, and particularly whether there was any difficulty in articulating his s's. He would have been very grateful if he could have seen the man before the operation, and to hear him say the word "scissors." He had a case under his own care at hospital at the present moment, and it was giving him very great anxiety. The trouble in this case was chiefly not because the girl could not eat, but because her speech was so badly affected that she wished something done. Her s's were particularly bad.

He also wished to ask Mr. Watkin how long the splint was kept on, and whether the two jaws were tied together tightly for all the length of time the splint was kept on.

Another point was that it would be interesting to test whether the teeth gave their normal reactions to heat and cold in the mandible. That would give some indication of what had happened to the inferior dental nerve on each side.

In conclusion, he desired to congratulate the two gentlemen concerned upon such a successful issue.

Mr. Watkin said he had already mentioned that the speech was greatly improved. He thought the "s" was the greatest difficulty before. He used the word "sausage" or "Cissie." "Scissors" was rather a good word. The patient could speak quite clearly afterward.

Mr. Packham asked whether Mr. Watkin could assure him that the patient could say "scissors" now.

Mr. Watkin replied that the patient was now able to pronounce the word "scissors" perfectly. The splints had been kept on, firmly fastened, for six weeks, to allow the bone to unite firmly. The operation was on a Tuesday, and the splints had been taken off on the Saturday before the expiration of the six weeks. There was no question that the bones had all grown together quite properly.

MESIOCLUSION COMPLICATED BY INFRACLUSION OF ANTERIOR TEETH*

By William R. Humphrey, D.D.S., Denver, Colo.

DURING the treatment of this case the patient complained of a pain through the back. Dr. Ketcham referred him to Dr. Clough Burnett of Denver, who is one of our ablest diagnosticians. Dr. Burnett's history of this case is very interesting to us as orthodontists because many of the symptoms noted by Dr. Burnett and also by Dr. C. S. Bluemel, psychiatrist who examined the patient, are the same as those observed by orthodontists in patients suffering from these extreme malocclusions and their attending deformity. The complete family and personal history of the case by Dr. Burnett is as follows:

First seen April 12, 1926, age 21 years.

Family History.—Mother and father are living and well. Three brothers and one sister are living and well. One brother died in infancy and one at eight years of age, of unknown causes. There is no constitutional disease.

Present Complaint.—Pain in lower lumbar spine of from seven to eight years' duration. Tired drowsy feeling for ten years.

Personal History.—The patient had measles, chicken pox and mumps in childhood; pneumonia at from three to four years of age; considerable tonsillitis until tonsillectomy in 1920. One year ago he had food poisoning (?) which lasted for from three to four days. The patient states that his family are all of a nervous disposition. He has always found it hard to concentrate his thoughts or mind. This was worse in high school and finally caused him to withdraw from the University of Colorado after one year. He is now unable to read a book or article of any length or to keep busy at one job for any great while. He states that he has always been backward and bashful and has not sought companionship of either young men or women. He has had the desire for social intercourse but has always felt out of place. He has always been self-conscious but at present not so much as formerly. For the past ten years a tired drowsy feeling has been progressive, and he "has no pep." He feels listless during the day with no ambition whatever. During the past seven or eight years he has had a pain in the lower lumbar spine. Heavy work or exercise increases the pain, which has been more noticeable recently. This is a dull constant ache, worse at night, disturbing his rest. Partial relief is obtained only from mustard plasters, massage, and warm baths. Slight vertigo and spots before the eyes occur at times after a full meal. There is no headache, tinnitis, convulsions, spasms or paralysis; no colds or sinus infections; teeth, ears and neck are all right. There is no

*From the practice of Drs. Ketcham and Humphrey.

Read at the Twenty-ninth Annual Meeting of the American Society of Orthodontists, Nashville, Tenn., April 8 to 11, 1930.

dyspnea, cough, expectoration or pain in chest. A precordial pain is noted two to three times per month, described as a cramp, lasting only a few seconds which comes on at any time. There is "just a tired feeling" in legs. He uses tobacco very little

Examination.—The patient is a well-developed, well-nourished, young adult male, who does not appear ill. The skin is moist. There is cyanosis of the hands on standing. The essential pathology consists of tenderness upon pressure over the spines of the fourth and fifth lumbar vertebrae. There is moderate pain in this region when the patient bends his body to either side and less so when bending forward. There is slight tenderness upon pressure over the second and third lumbar spines. There is no demonstrable tenderness over the sacroiliac joints or over the lumbar muscles. The heart is negative except for an occasional missed beat. Blood pressure studies:

Lying	108/65
Sitting	105/65
Standing	98/70
100 hops	125/70
2 min.	115/74

Diagnosis.—Neurocirculatory syndrome. Sacroiliac subluxation. Consider endocrine disturbance as cause of mental symptoms.

Treatment.—Mixed gland (male), No. 1 (B. and W.) 1 pc.

4/27/26. No effect from gland R, strapping caused complete relief. On each visit certain suggestions of minor delusions are noted, as people noticing on street, talking about, etc., suggesting psychoneurosis.

5/14/26: Report Dr. C. S. Bluemel: Psychoneurosis.

When questioned as to how early the malocclusion had been noticed, the patient thought at about five years of age. I asked if there were any early photographs, and he furnished me with two interesting family groups. A brother three years younger also has a mesioclusion and is still under treatment. The other members of the family all have normal mesiodistal relations of the jaws.

The two boys were the last of seven children, one died in infancy and one at eight years of age, of unknown causes. Both the brother and the patient under discussion have mesioclusion, but the patient has an infraclusion of the anterior teeth (so-called open-bite), while the brother has a mesioclusion with supraclusion of the anterior teeth (so-called closed bite).

Now perhaps the predisposing cause of these two cases was the same. The definite etiology is unknown. But the direct determining causes were not all identical, the patient with the open-bite having an abnormal muscular habit in the form of a tongue habit. The law of coincidence may as easily be applied to brothers as to any others, and whether caused by metabolic disturbance, a deficiency disease, or an endocrine unbalance, it could as well happen to brothers as to two boys of widely separated parentage. If it is of hereditary origin (the fact that these two brothers both present a mesioclusion), it is interesting to note that none of their relatives attest to any of the members of the family ever having such a deformity. Of course, one

might say that they do not observe closely and are not apt to notice whether they were what we generally accept as normal or not. However, a mesioclusion is such a marked deformity that such terms as "lantern jaw," "bulldog chin," etc., are common terms, and the condition is recognized by everyone.

The orthodontic diagnosis disclosed (Fig. 1) a mesioclusion with infraclusion of the anterior teeth (so-called open-bite), an underdeveloped maxillary arch, and an overdeveloped mandible. Three third molars were present, the mandibular left and right and the maxillary left. These were extracted before treatment was started. There was also a marked periodontoclasia (pyorrhea), and we referred the patient to Dr. A. C. Hamm for treatment. His report is as follows:

"Patient, aged nineteen years, was referred to me by Drs. Ketcham and Humphrey on July 9, 1924, for treatment. His teeth were in serious mal-

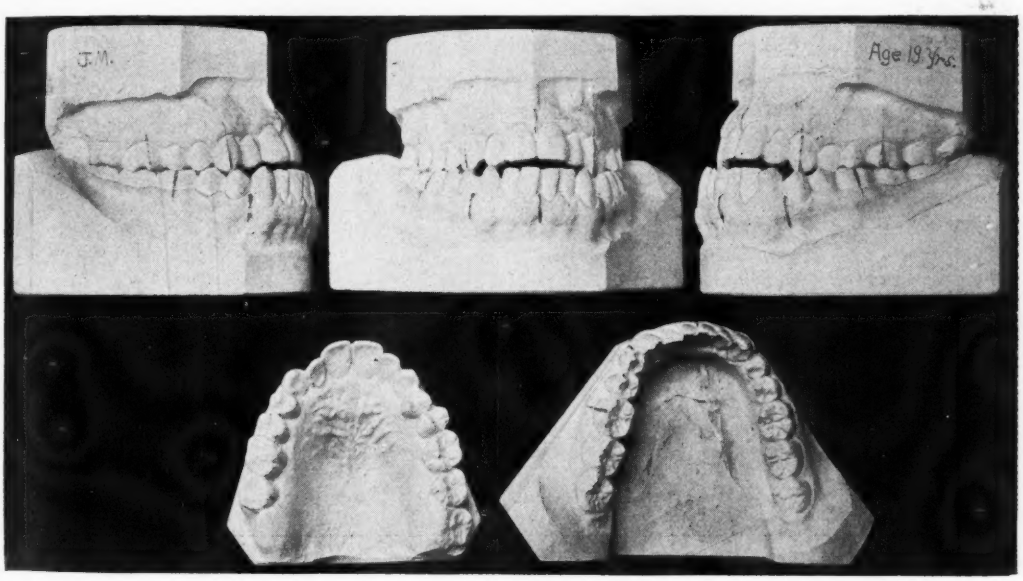


Fig. 1.

occlusion, presenting a Class III case. The gums and peridental tissues, suffering from lack of normal function in mastication and neglect from proper hygienic care, were congested, spongy, of a cyanotic color, and in many places were detached from the cementum from varying depths of four to eight millimeters. Careful curettement of the root surfaces and planing of the cemento-enamel junctions were indicated, as well as polishing of all coronal surfaces. Correction of the traumatic occlusion in this case was left to the orthodontist.

"After the operations were completed, there was a regeneration of tissue, and a gradual return to a normal contour and color tone of coral pink took place. The investing tissues of the teeth, now being in a physiologic, rather than a pathologic condition, the case was returned to Drs. Ketcham and Humphrey for orthodontic correction.

"Following the correction of the malocclusion, the case has been examined from time to time, and no return of the periclasial condition has been noted."

When the patient returned from Dr. Hamm on September 30, 1924, orthodontic treatment was started. The active treatment was accomplished by means of the ribbon bracket appliance. Plain gold-platinum bands were fitted to both maxillary and mandibular first molars with curved sheaths soldered to their buccal surface. Bracket bands were fitted to both maxillary and mandibular six anterior teeth. Hooks for intermaxillary ligatures were soldered to the ribbon arch used on the mandibular teeth, at a point just distal to the canines. Intermaxillary force was started at once, ligatures being worn from the hooks on the mandibular arch to the distal ends of the curved sheaths on the maxillary molar bands. After fourteen months of active treatment, the

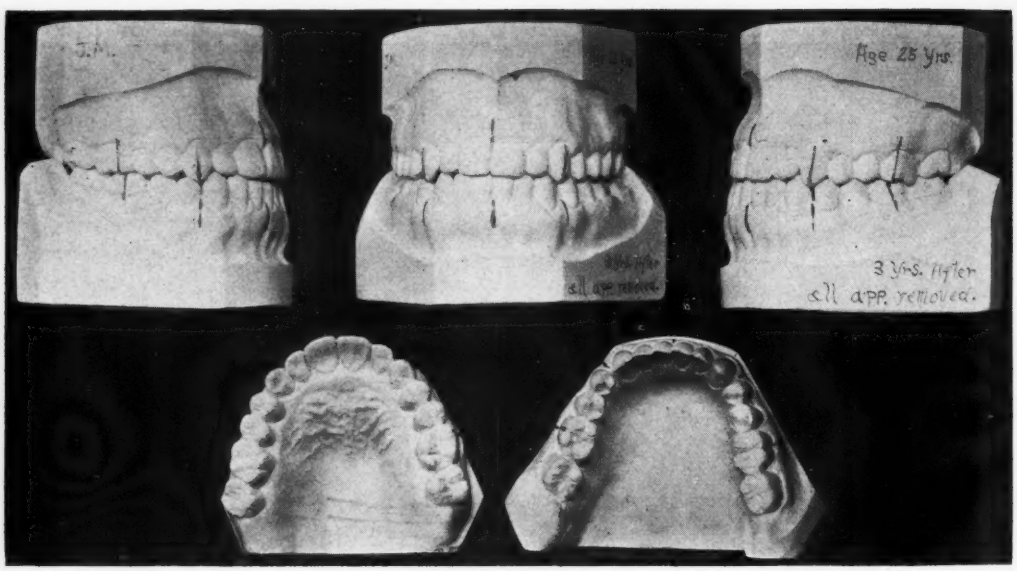


Fig. 2.

teeth having been placed in positions of mechanical advantage, the ribbon bracket appliance was removed, and lingual arches were placed on both maxillary and mandibular arches. These were not soldered but attached to the molar bands by means of the half-round tube and post, thus allowing adjustment if needed. Hooks were soldered to the buccal surface of the maxillary molar bands for intermaxillary ligatures and the mandibular canines were banded with plain gold-platinum bands connected on the lingual with an 0.030 gold-platinum round wire. Hooks for intermaxillary ligatures were soldered to the labial surface, terminating on the buccal surface of the mandibular first premolar. With this form of maintenance intermaxillary ligatures were worn at night. The patient was also instructed in the development of the masseter-temporal muscle, keeping the lips closed and biting in favorable occlusion. The muscle was tensed and relaxed until noticeably fatigued, the treatment as suggested by Dr. A. P. Rogers of Boston. The patient was very faithful in this exercise, and I believe it has been important in retaining the teeth in the

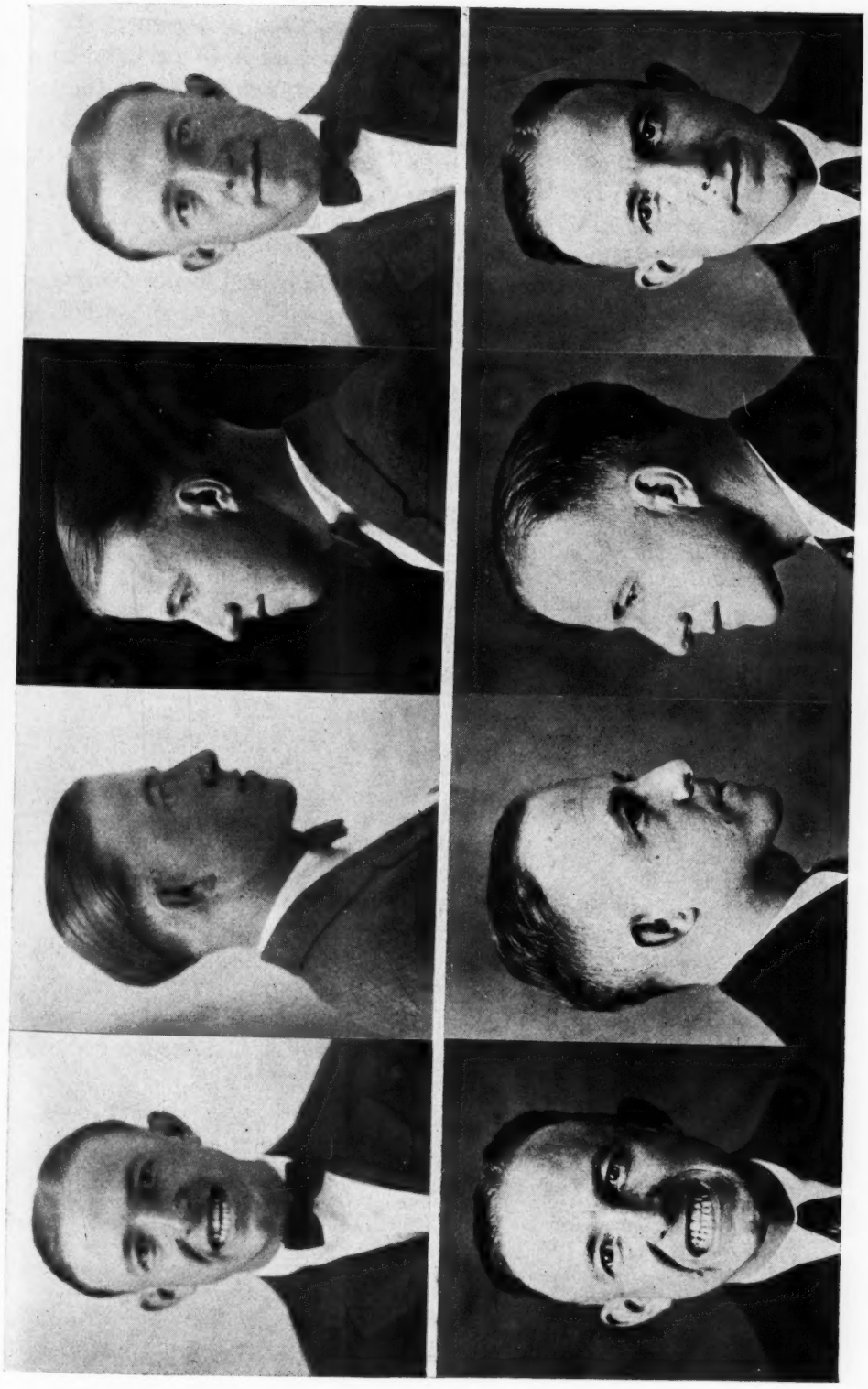


Fig. 3.

occlusion shown in Fig. 2 which shows the models three years after all appliances were removed.

Fig. 3 shows the face before and three years after treatment.

In conclusion I might again remark, as has often been said, that many cases of unknown origin can be successfully treated. I believe the prognosis in this case is favorable. Another fact of interest to us as orthodontists is that when examined by Dr. Burnett the patient was unable to read a book or article of any length or to keep busy at one job for any great while, and also the fact that he withdrew from the University of Colorado after one year. He was examined in April, 1926. Since orthodontic treatment has been finished, most of his mental symptoms have disappeared, and he has finished two years' study for the priesthood at the Abbey School in Canon City, Colorado, where he is now a student. The course is an extremely difficult one. Would it be presuming too much to say that his retiring attitude or inferiority complex was due to his deformity caused by this serious malocclusion? Only time will tell. In conversation with the patient the first of this month, he told me he never experienced such good health, his sleep is undisturbed, and he has lost the listless feeling which prior to 1924 had been constant. The pains of which he complained have disappeared, and he seems cheerful, alert, and is interested in his work.

A CASE OF NORMAL DEVELOPMENT*

By A. M. Davie, L.D.S., England

MR. DAVIE said the title of his communication described correctly the case he desired to bring under the notice of the Society, since no treatment whatever was given to it other than the wearing of elastic bands at night to approximate the two maxillary central incisors. He advised it merely because the mother did not like the space, but he woud not describe it as treatment. The child in question was now twelve and one-half years of age. The illustrations shown were from three sets of models taken at different ages and from one set of models of the mother's mouth, together with one photograph of three generations—the maternal grandmother, the mother and the child, showing the facial types.

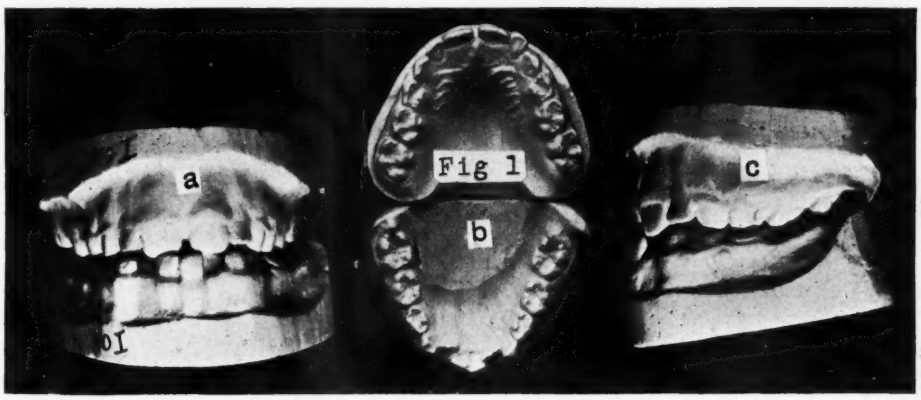


Fig. 1.—*A* and *C* show incorrect occlusion owing to photographer's error.

Fig. 1 shows the first set of models taken in April, 1924, when the child was six years and eight months old. Mandibular incisors crowded, and arch somewhat constricted laterally with posterior teeth inclined lingually. The maxillary arch seems narrow at c | c and 1 | 1 are spaced. Comparison with the mother's arches caused foreboding (in view of present-day diet), and it was difficult to know what treatment to adopt.

The mandibular incisors were in quite normal relationship with the maxillary incisors, but the maxillary centrals were spaced and the mandibular incisors were definitely irregular.

The illustration shows the occlusal surfaces of the teeth; the mandibular incisors irregular, and the mandibular arch constricted. The maxillary arch also appears narrow in the canine region and the incisors spaced.

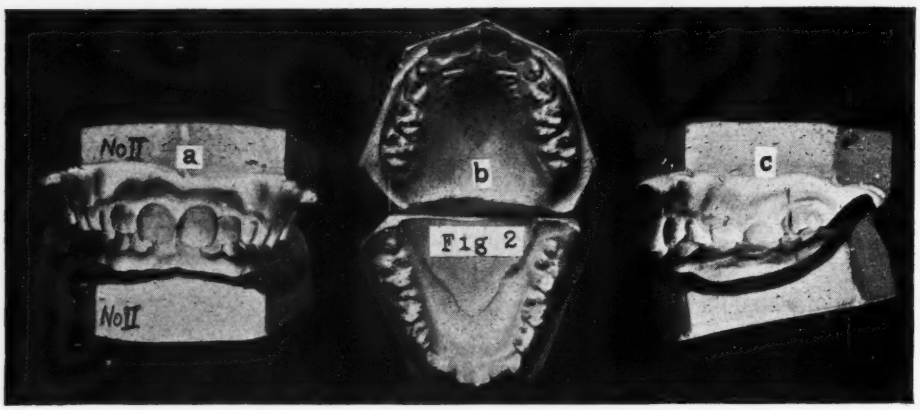
The author was uncertain what to do. Looking on the darker side of things from an elementary knowledge of orthodontics, he thought the irregu-

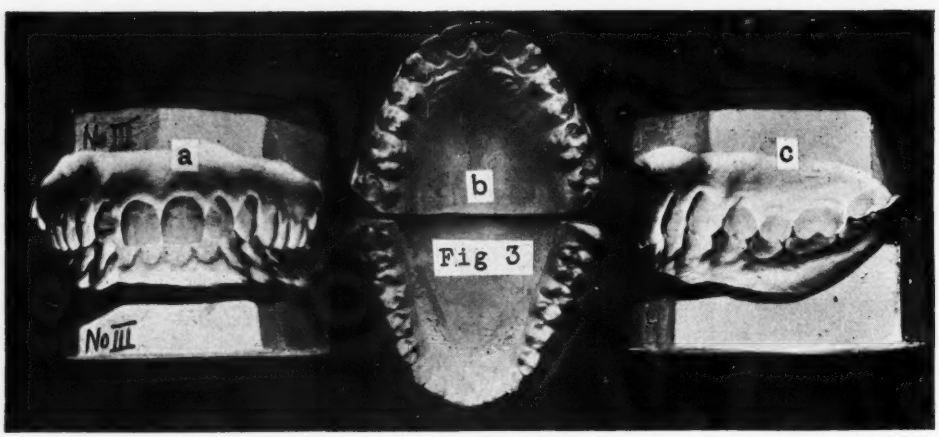
*Transactions of British Society for the Study of Orthodontics.

larity was almost certain to grow worse; therefore he sent the models to Mr. Chapman for an opinion. Mr. Chapman replied saying it would be wise to wait and watch for development.

The second set of models was taken in December, 1925, a year and eight months later (Fig. 2). Both arches have improved and the mandibular incisors are definitely less irregular (adenoids were removed at this date, and tonsils two years later, December, 1927).

The illustration shows the teeth in very much better alignment and the maxillary centrals approximated a little. (At this time the child was wear-





ing the small elastic bands.) The mandibular incisors have improved and the arches are nearly normal.

The last set of models was taken in September, 1929, nine months later, the child being then twelve years of age (Fig. 3). The illustration shows the occlusion and the arches normal. The maxilla and mandible are in harmony with the rest of the face. The overbite, however, is not quite normal.

He regretted that no models were taken of the deciduous dentition. There was no mouth-breathing. The child was artificially fed, and later had ordinary diet with a fair proportion of crusts and hard food. As there was only one child, there were no other models for comparison.

Fig. 4 shows models of the mother's mouth, taken some time previously. The six-year molars are in correct mesiodistal relationship. Occlusion is normal, with irregularity of mandibular incisors. In the maxilla the arch is narrow anteriorally. In actual life this latter is quite imperceptible owing to the facial contour corresponding to the arches. The mandibular incisors

are irregular as in the case of the daughter, and the maxillary arch is rather constricted in the canine region.

Fig. 5 shows the models of the child and one of the mother. The improvement which has taken place is clear when the first, second and third set of the child's models are examined. He thought it would be agreed that both arches are now quite well arranged.

Fig. 6 shows photographs of the faces of the three generations. The occlusion in the case of the child seems to be almost ideal; the maxilla and

mandible are in harmony with the rest of the face. The mother's arches, it would be recollected, were rather narrow, and it would be seen that the face looked somewhat constricted laterally. The position in the photograph was a very good one from his point of view, because the patient was looking down, giving a view of the prominent chin and constricted arches. The position of the grandmother was not so fortunate, for the photograph shows her face in a rather different aspect from that of the mother; they are, however, extraordinarily like each other, with the same type of face; the apparent difference is due to the photograph.

The maternal grandmother says she had very good teeth until sixty years of age. They were then extracted by her doctor's advice. Unfortunately there are no models.

Unfortunately there are no models available of the father's teeth, his teeth being lost early through caries, but the mandibular incisors are in correct alignment, and it may be noted that the child began with irregular mandibular incisors (like her mother), and ultimately they became normally arranged (like her father).

He would like to add in conclusion that he approached the case in a spirit of alternate fear and hope rather than with any foresight as to the ultimate result. He would not have taken much notice of the models or the case in the usual course, had not the President, to whom he showed the models, suggested their exhibition to the Society.

DISCUSSION

The *President* said the models Mr. Davie had shown were very interesting. He would like to ask if there was spacing of the deciduous teeth prior to their being shed.

Mr. Northcroft said it was the type of case, he thought, which was of great value to the members of the Society, because it helped to teach such a lot, especially on the side of

noninterference too early. He was a great believer in early interference, but the problem of when to interfere and when to leave well alone probably needed more judgment than any other question in orthodontics. He had always been a great believer in members taking serial models and keeping them, and the present communication afforded a striking example of the wisdom of that practice. By taking and keeping his models over a series of years, Mr. Davie had proved a point which could not possibly be proved in any other way. No one would have believed Mr. Davie if he had simply said, "Here are the models I took in 1924. I assure you the child has now perfect occlusion." The production of all the models, however, proved the point, and made the communication a very valuable one.

Mr. Samuel said the cynical thought came to his mind when listening to the paper that perhaps some of the cases treated would have been better untreated. It occurred to him that a possible explanation (if Mr. Davie was looking for one) in the particular case in question was that the child was happy in having particularly large deciduous second molars.

Mrs. Lindsay said she was very much interested in the case Mr. Davie had described, but would like to know what would happen when the wisdom teeth came in; if Mr. Davie was able to take and show models when that happened, it would be very interesting. There was a series of models, which perhaps Mr. Davie saw, at Liverpool of the mouths of children from early years up to twenty-five years. About the age of twelve years the teeth were quite normal, and there was very good occlusion; but when the wisdom teeth came in, the incisors became irregular. She wondered whether in the present case the incisors might not overlap, as the mother's did, when the wisdom teeth came in.

Mr. Packham said it would be interesting to know the history of the child from the general point of view, as to what illnesses, if any, she had had during the period when Mr. Davie was so fortunate as to be able to observe the case. Some reference had been made to the use of elastic bands, and he would like to know whether any treatment was necessary to bring the two central incisors together, and whether the general bone growth was normal or abnormally accelerated during the period under review.

Mr. Davie, in reply, said the President had asked if there was any spacing of the deciduous teeth prior to shedding. There was none; the deciduous dentition was normal. All the maxillary and mandibular teeth were perfectly aligned; and there was no irregularity. He began examining the child's mouth at the early age of three and one-half or four years.

The *President* said his point was not so much the irregularity of the deciduous dentition as the question of spacing, the actual spaces between the teeth.

Mr. Davie said there were none; the teeth were all touching laterally. Mrs. Lindsay would like to see the models when the wisdom teeth came in. He would do his best but was afraid to make any promise. Mr. Packham had asked from what illnesses the child had suffered. He had followed the course of the child's growth very carefully, but he did not remember any illness other than mumps. As to treatment, he gave the mother a box of small elastic bands to put on at night, and he thought the child wore them for about three months. He did not know if it did any good but supposed it helped a little. They were worn only at night, because the mother thought the space was rather unsightly. He did not think it had much effect in bringing them together. Mr. Packham's last question, as to whether the child grew normally, was rather difficult to answer. He thought she had grown rather quickly, but, like other children, she seemed to have growth periods. Speaking generally, he thought the child did grow normally.

Mr. Northcroft, referring to the use of elastic bands, said he wished to give a most earnest warning to young orthodontists against their use uncontrolled. He had seen cases where the band had slipped up the neck of the tooth and it had been lost in consequence. It was most important not to give apparatus to mothers or nurses to apply at their own sweet will.

Mr. Steadman recalled one case he had come across where an elastic band was put on the two maxillary centrals and two maxillary incisors, and passed over those four teeth; he saw it in the palate above the actual roots of the four teeth. The whole of the bone supporting the four teeth was loose and had to be taken away together with the teeth. The band was high up in the palate.

SOME POINTS IN THE TREATMENT OF DISTOCLUSION*

By Jos. D. Eby, D.D.S., New York, N. Y.

AFTER consenting to present a brief case report on this subject my thoughts have sought the most essential phases to consider.

I decided not to treat of the mechanistic side of the question but to dwell upon a few thoughts which must be taken into account before treatment.

It is probable that what I have chosen to present is equally applicable to any type of malocclusion. I believe it is, but certainly so in cases where oc-

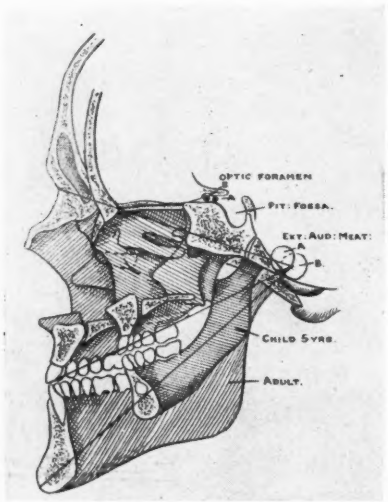


Fig. 1.

clusion must be equalized to the extent that form in bone is established largely by function. The mandible undoubtedly is a bone of many vicissitudes in development and occupies a rather unique sphere among the irregular bones.

In the first thought it is a bone of intramembranous origin. As an irregular bone it is composed of the various forms of osseous structures, from dense cortical to rare cancellus tissue.

While its blood supply is abundant for the delivery of calcium phosphate, the possibility of its acquiring a poor start in a modern environment is equally likely.

There is one phase about the mandible which is not sufficiently taken into account, that it is a bone suspended in soft tissue. It may be comparable to an arm resting in a sling. It is a well-established fact through the works of such authorities as Doctors Hellman, Keith, and Campion (Fig. 1) that the direction

*Read at the Twenty-ninth Annual Meeting of the American Society of Orthodontists, Nashville, Tenn., April 8-11, 1930.

of growth of the bones of the face is downward and forward, broadening all the while posteriorly.

In his recent works on the radiographic examination of the hands and wrists of children from the ages of five years to full growth, Dr. Clinton C. Howard has demonstrated by comparison that the average age for complete formation of the bones of the face will range from eighteen years in girls to twenty-one years for boys.

We know that this definite direction of growth inherently follows the lines of racial type and more directly those of family resemblances.

We know that the desire to develop normally is dependent upon the influences of function, calcium phosphate metabolism, and the good or bad effects of environment.

I have recently seen the case of a young woman twenty-six years of age who suffered an ankylosis at the age of three years with complete disuse over this period, with the substance of the mandible developed to but about half of its intended volume.

Dr. Leonard M. Gunton has prepared an interesting collection of casts of children between the ages of two and one-half to six years demonstrating normals in the various ages through this period, and the early signs of malocclusion. The majority of these cases evidenced early signs of deep overbite, a leaning inward of the mandibular teeth, a certain locking effect in the occlusion, and the first natural tendency toward retarding the development of the mandible. With this influence or function, other acquired effects may enter to contribute their tendencies toward a lack of development, expressed in other words as a posterior occlusion.

In the normal forward thrust of the mandible in growth it is at this early stage that the mandible loses substance horizontally, vertically, and in the third point of dimensional space. This condition of affairs during these early ages usually escapes notice, and it is not until the age of six or seven years that the appearance of the teeth will bring the matter to the attention of the parent or the dentist.

If we consider a given age, say seven years, wherein a definite state of distoclusion exists, it is necessary still to take into account that this complex organism composed of many varied tissues is still a changing growing substance. At this age it is not a question so much of the teeth to be considered, as it is of the entire surrounding structures. Our interests must be centered from the floors of the orbits of the hyoid bone, and possibly if we were more enlightened, we might include the entire posture of the child.

In the axiom, that teeth may be placed where it is thought they should be, but Nature will eventually adapt them to where they best suit the individual organism, we must look far beyond the teeth for principles of treatment where the true fault lies if we expect ultimately to establish the teeth in normal or desirable positions.

Much has been written for and against early treatment wherein some optional doubt could exist. Much can be said on the preventive value of early treatment under certain conditions.

Fig. 2 is a typical illustration of the protrusive type of distoclusion between the ages of the full eruption of the first permanent molars and incisors and the too shortening of the roots of the intermediate deciduous teeth.

I wish to invite your attention to the structures around the teeth and the influences cast upon them. The positions of the lips and the entire musculature either pacifically or in function are entirely against any hope for the bony structures to recover correct formation.

Simple corrective measures at this period will eliminate the complications mentioned, and by harmonizing teeth and function it stands to reason that

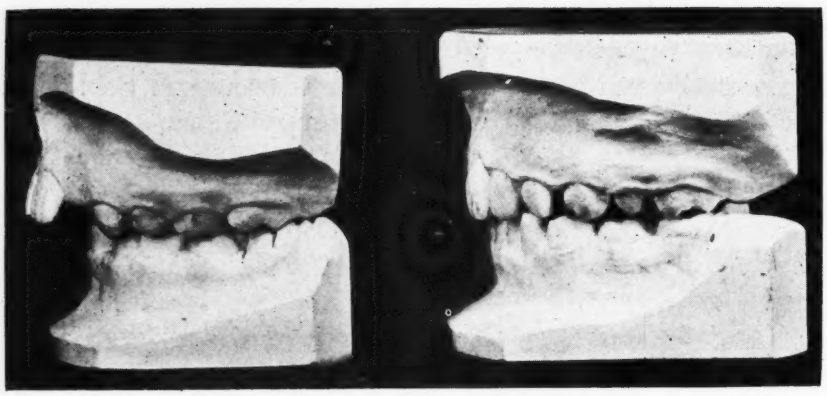


Fig. 2.

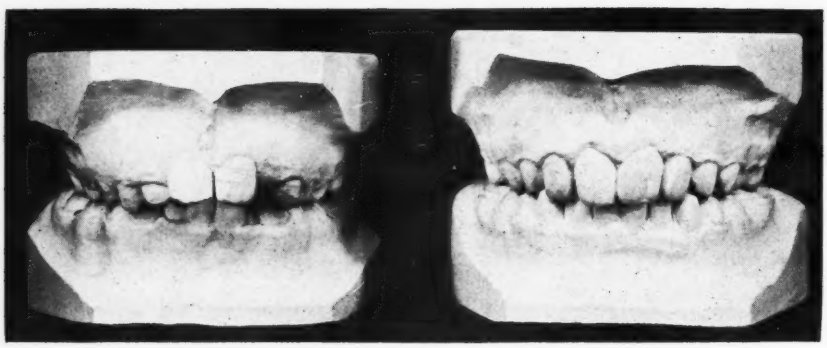


Fig. 3.

a far reaching effect will be thrust out into the deeper structures which in turn must be harmonized to the forms of the symmetrical arches which sustain the teeth as the foundation.

Fig. 3 presents a bone study rather than a tooth study in a form which is much more valuable and interesting than tooth position, save wherein they are associated.

Fig. 4 is a case of distoclusion with normal lip pressure which illustrates after a fashion the same thought of a distoclusion of this type.

I do not think it can be conceded that all the ill effects of the early general malformation can be completely overcome during this age. As the field in which we are interested continues to mature, treatment save of a light re-

tentive nature must necessarily practically cease until the full eruption of the permanent teeth, including the twelfth-year molars. From this time on, the growing organism passes through the preadolescent, adolescent, postadolescent, and full growth periods. Changes during these times come at intervals which cannot altogether be foreseen.

It is my belief that before perfect harmony is established between normally occluded dentures and the tissues of the face in cases of distoclusion, the finishing touches must be accompanied by definite growth periods.

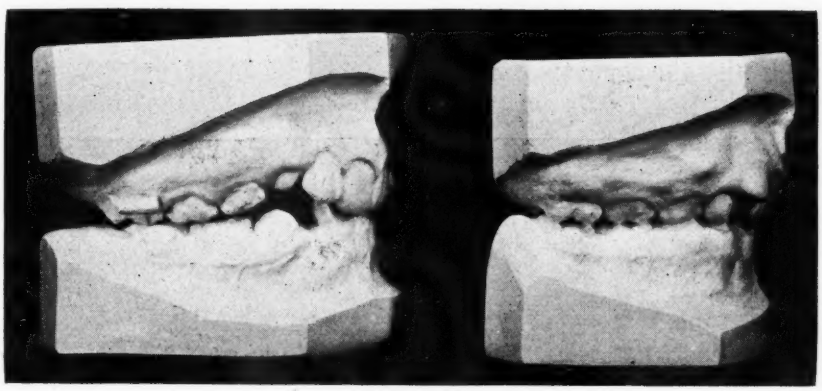


Fig. 4.

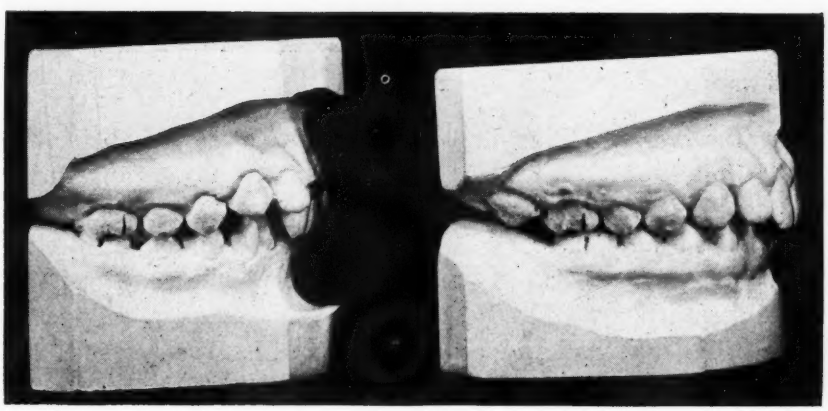


Fig. 5.

Fig. 5 is of a case where there was undoubtedly an anterior movement of the maxillary posterior teeth and a complete posterior position of the entire mandible. The appliances indicated to my mind had to possess a necessary degree of flexibility so that the desired response in all directions could proceed unhampered. It required three years' treatment to produce the result, and my belief all the while was that the appliances were not correcting the malocclusion, but that the teeth and jaws were growing in the desired directions under the guiding influence of the appliances. This was a case of a girl, begun at the age of twelve years, and completed at the age of fifteen years. From this period on her mouth continued to improve with little or no attention.

Fig. 6 is the case of a girl who possessed a rather unusual type of distoclu-

sion, and the general preparation for the development and alignment of her arches was begun at the age of twelve years. Following this, maxillary labial and mandibular lingual arches with intermaxillary elastics were applied and the hopeful treatment of correcting the distoclusion was begun. A period of more than two years followed with so little response that the case became a discouraging one. This girl departed last May and did not return until November. During this period she had taken on a remarkable general growth, and it was hard to believe the fine response which had transpired in her mouth and face. It may be that the two persistent and discouraging years were lending an actual influence, and again it may be that with a deeper insight and a keener foresight the same result could have been accomplished in a much shorter time with the same treatment.

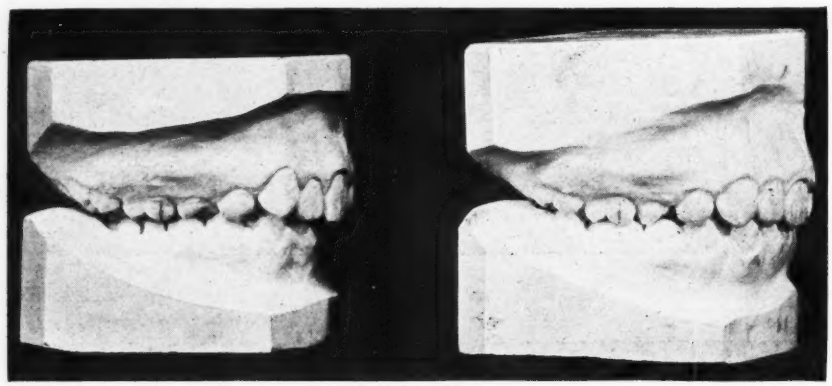


Fig. 6.

Some of the worst looking and most extreme cases of distoclusion have not shown definite signs of lasting improvement in my hands until the individuals are practically grown.

As to the question of intermaxillary ligatures, intermaxillary occlusal stops, or last but by no means least the question of bite planes—treatment must precede a deep inherent knowledge of the facts behind the case.

It is my belief that modern enlightenment in the facts concerning the face, case analysis, and diagnosis are rapidly dictating treatment as a prescribed measure.

May we hope and continue to strive for the day when the ability to do the right thing at the right time will be the heritage which the science of orthodontia can offer to the service of mankind as the result of the labors of those who have worked to bring about this condition.

TREATMENT OF AN ADULT OPEN-BITE CASE BY GRINDING THE OCCLUSAL SURFACES OF POSTERIOR TEETH*

By Herbert A. Pullen, D.M.D., Buffalo, N. Y.

HISTORY.—The patient, whose photograph is shown in Fig. 1, was a young man twenty-three years old at the beginning of treatment in September, 1927. The facial deformity, exhibiting the open-bite in the anterior region and constantly open mouth, but more especially the lack of masticating occlusion, sufficed as reason for consulting an orthodontist to see whether something could be done to relieve these conditions, which were quite distressing.

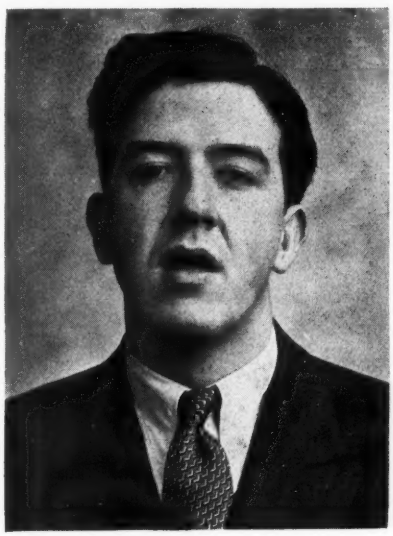


Fig. 1.

The face was unduly elongated, the mouth distorted and constantly open, causing the gum tissues, teeth and tongue to be unusually dry, and the fluids of the mouth were somewhat viscid.

As far as he knew, he had always had this malocclusion and facial deformity, and no one up to this time had pointed out the possibility of correcting the malocclusion and facial lines. His dentist, one of my former students, finally called this possibility to his attention and referred him to me for consultation.

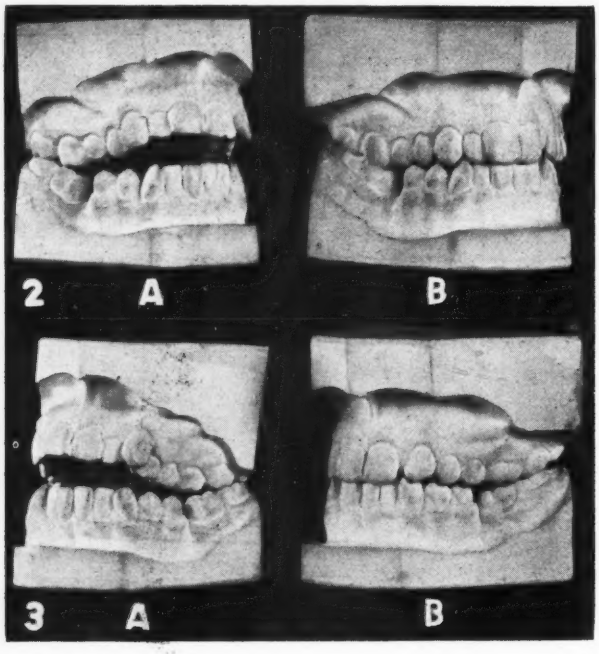
Attributed Etiology.—The causative factors in the case, outside of being associated with mouth breathing, were obscure, in spite of the exaggerated malocclusion and facial deformity directly caused by the lack of normal oc-

*Read at the Twenty-ninth Annual Meeting of the American Society of Orthodontists, Nashville, Tenn., April 8 to 11, 1930.

clusal and muscular function and the substitution of abnormal occlusal and muscular functions during a considerable period of time.

Diagnosis.—The case is one of neutroclusion (Figs. 2-*A* and 3-*A*) with excessive anterior open-bite or infraversion of all the anterior teeth and of the posterior teeth as far distal as the second molars, which are the only teeth in occlusion in the mouth. Due in part to the abnormal stress of the muscles buccally to the dental arches, the maxillary dental arch is narrower than the mandibular, the maxillary left canine is in labioversion, the mandibular first permanent molars are lost, and their space is partially closed.

Treatment Therapy Employed.—As the open-bite or infraversion of the incisors, canines, premolars, and first molars was so extensive, the bringing of these teeth together by mechanical appliances was out of the question, and



there remained but two methods of treatment: a possible surgical resection of the mandible at the angle and a resetting of the teeth of the mandible in occlusion with those of the maxilla, treating the case as a fracture case by fixation, etc.; or grinding all of the posterior teeth in both maxilla and mandible until the best occlusion of the greatest number of teeth could be attained.

The possibility of the surgical resection of the mandible appealed to neither the patient nor myself, and the mandible exhibited an angle so near to normal that a nearer approach to a right angle through resection and placing the teeth of the mandible in occlusion might tend to a facial deformity at the angle of the mandible.

The other method, that of grinding the posterior teeth in both dental arches until the best occlusion possible could be obtained, was thus chosen by elimination, and because it promised a solution of the treatment problem provided that the maxillary arch was widened sufficiently so that the buccal

cusps of the premolars and molars would overlap those of the mandibular arch, and provided compensation in the number of teeth in the maxillary arch compared with the deficiencies in the mandibular arch be obtained.

The maxillary left lateral incisor, being excessively carious and short-lived, was extracted for purposes of compensation; and treatment was initiated to widen the maxillary arch to occlude with the mandibular, at the same time moving the maxillary left canine partially into the space left by the extracted lateral.

A lingual arch with auxiliary springs was used with seamless bands on the maxillary first molars for anchorage, and seamless incisor bands were used on such of the incisors as was necessary for secondary anchorage to make the appliance more positive in its application.

After the maxillary arch had been sufficiently widened, the process of grinding the occlusal surfaces of the posterior teeth was started, beginning with the second molars in both dental arches.

Fig. 4.

During the grinding of the occlusal surfaces the cusp and sulci formation was preserved as well as possible by the use of small-sized carborundum wheels of three-eighths inch diameter and three-sixteenths inch width.

As more teeth came into occlusion, carbon paper was used between the grinding surfaces of the ground teeth in articulating positions in order to determine the high points that needed grinding; and, as sensitive spots were exposed, a solution of 40 per cent formalin was used to desensitize these areas, care being taken not to get any of this caustic material upon the soft tissues.

After carrying on this grinding process once a week for four months' time, the teeth of the maxillary and mandibular arches were finally brought into the best occlusion possible, considering the age of the patient, the complications by extractions, and the excessive open-bite.

Results Achieved.—A fairly well-balanced functional occlusion was attained as shown in Figs. 2-*B* and 3-*B*, and this was gradually increased by the initiation of the daily exercise of the masseter temporal group of muscles.

The photograph of the patient after treatment, Fig. 4, shows that the young man is able to keep his mouth closed, and a strong well-balanced musculature surrounding the oral cavity has been obtained. The photograph was taken almost two years after treatment was completed, during which time the masseter temporal exercises have been continued, and there has been no return of the open-bite condition.

Prognosis.—One can forecast a permanent result in the closure of the jaws, a good masticating occlusion, and very little change in dental arch relationship except such as might be caused by subsequent tooth extraction, which is to be expected in adult cases in which large dental cavities have been filled and in which such extensive grinding has lessened the distance of the pulp cavities of many of the teeth from the occlusal surfaces. However, it is reasonable to believe that enough secondary dentine was laid down during and after the period of grinding to protect these pulps to a considerable extent.

TECHNIC IN THE TREATMENT OF IMPACTED CANINES*

By Clifford G. Glaser, D.D.S., Buffalo, N. Y.

THIS clinic has to do with some different attachments and methods in the treatment of unerupted anterior teeth.

Let us first take up the incision to allow access to the crown of the tooth. It should be made in crescent form as near as possible to the normal point of eruption of the tooth. This procedure places the surplus flap of tissue on the side of the tooth opposite from the direction in which it is being moved.

The surplus flap of tissue should not be removed, as it fills in after the tooth is moved and especially in the roof of the mouth leaves the rugae normal afterward.

As soon as the incision is made, a packing should be tightly placed to retain the opening.

There are a number of materials used for packing, such as beeswax and cotton, temporary stopping, paraffin, cement, etc., but let us here consider temporary stopping only.

At first, spatulas, etc., were used to place the packing but by this method the packing was never tight and rocked. Generally this allowed the formation of granulating tissue at the margins of the incision, especially at the bottom. This would obscure the view of the tooth; the granulating tissue would be very sore and bleed easily.

In improving this technic a high pressure metal syringe, Fig. 1, with tips of different sizes to fit the incision tightly was used. In the syringe was placed the temporary stopping.

With a tip on the syringe to fit rather tightly in the incision, the syringe is heated slightly over a flame until the temporary stopping can be forced freely from the tip.

Then the tip of the syringe is placed in the incision against the crown of the tooth, and as pressure is applied the tip is forced upward to the surface. At this time a spatula should be placed at the edge of the tip against the tissue and the syringe drawn across it, leaving a tight packing.

Then with an appliance placed over it for protection, the margins of the incision should be allowed to heal. Generally about a week's time is necessary.

If the opening is a little too small, it can be stretched somewhat at the next sitting with another packing placed tightly in the opening.

After this opening is obtained, an attachment may be made and placed on the tooth. There are several forms of attachments, such as pins and wires cemented into the tooth, onlays cemented onto the tooth, and bands and tips made of banding material around the tooth.

*Clinic presented at the Twenty-ninth Annual Meeting of the American Society of Orthodontists, Nashville, Tenn., April 8-11, 1930.

For a canine lying just lingually to a lateral a simple form of tip attachment can be constructed in just a few minutes out of thin band material, or preferably out of Doctor Pullen's seamless incisor bands, as in Fig. 2.

In the construction of this attachment with one of the bands, flatten the band slightly, and with a flat nose plier pinch off the corners to form a cone, as in Fig. 2. Then with a burnisher or similar instrument open up the cone, but keep the corners tightly pinched together during this process. When the cone is formed, run a little solder in the seams of the pinched parts and solder a ring at the apex. Then the surplus pinched parts may be cut off and polished.

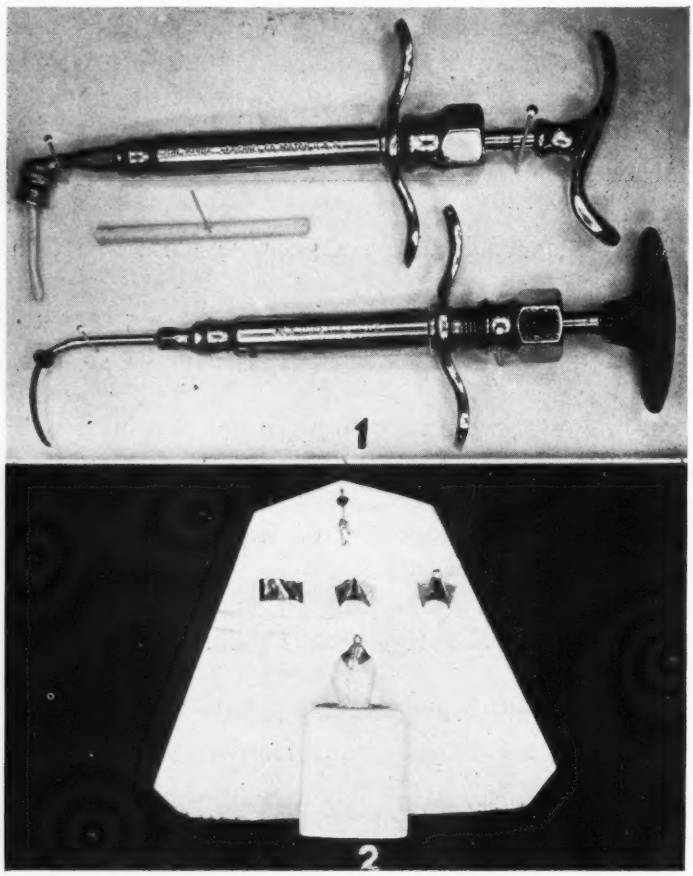


Fig. 1.—High pressure syringes containing temporary stopping and casting wax.
Fig. 2.—Close-fitting metal tips for canines made from seamless incisor bands.

After this construction it should be adapted by placing it on the canine on the other side of the mouth if it is present or another canine tooth or tooth form to approximate the form required. The long points of the cone should be on the lingual and labial sides of the tooth.

After an approximate fit to the tooth requiring the tip, grasp the ring with a pair of pliers, and pinch the points of the cone together slightly, and force it on to the tip of the unerupted tooth so that there is a little flare formed around the periphery, and it fits tightly. The periphery is the only place the cone should touch the tooth. The rest of the space is filled with cement.

This form of attachment is used because it is quickly constructed.

A cast onlay can be used in its place, but more time is required.

To form a wax pattern for an onlay, the syringe can be used in the same way as it was used for the temporary stopping. The onlay can be trimmed down to a thin piece or can be allowed to extend to the surface. If it is allowed to extend to the surface, the opening is thereby retained by it. It also can be used for determining the movement of the tooth.

CLINIC ON A NEUTROCLUSION CASE*

By Ernest N. Bach, A.B., D.D.S., Toledo, Ohio

SINCE the newer methods of diagnosis and classification have presented themselves, one might hesitate to classify the following case as neutroclusion; so, to avoid controversy, we shall assume it to be such a case.

Fig. 1 shows the photograph of the original models.

Fig. 2 shows the mandibular lingual removable appliance with a lateral U-shaped spring on either side engaging the first premolar on the distal side, the object of the spring being to aid in obtaining space for the second premolars.

Fig. 3 shows the anterior view of the mandibular model, with the labial arch to which were ligated the four anterior teeth. By the gentle process of stretching the main lingual arch with wire stretching pliers, adjusting a forward pressure of the springs and buccal tubes, the shape of the arch was obtained, and the second premolars were brought into position. Some expansion was obtained in the premolar region by the appliance shown in Fig. 4.

Fig. 5 shows the labial view of the model in Fig. 4.

Fig. 6 shows the lingual appliance used on the maxillary teeth at the beginning of the case. Lateral loop springs were used for expansion in place of the plain finger springs.

Fig. 7 shows the labial view of the appliance at the beginning of the case. The labial arch was used to obtain the desired movement of the six anterior teeth. Work at present was done only on the incisors. The canines were taken care of some time later, after they had erupted further.

Fig. 8 shows the appliance which was used later on the lingual surface to hold expansion. The lateral springs are 19 g. round wire.

Fig. 9 shows the labial view of the model shown in Fig. 8.

A band was placed on the maxillar left canine and attachment made to the labial arch by silk ligature to assist bringing that tooth into position. No assistance was given the right canine.

Approximately six months after the maxillary teeth were brought into relative position the maxillary appliances were removed, but an appliance was kept on the mandibular arch which is shown in Fig. 10, the anterior loop engaging the flat surface of the incisors. Very often extensions are soldered to the ends of the loop to engage the canines. Fig. 11 shows the labial view.

In Fig. 12 is shown Model 405 which was taken at the time the maxillary appliances were removed. Model 406 was taken approximately two years later.

*Clinic presented at the Twenty-ninth Annual Meeting of the American Society of Orthodontists, Nashville, Tenn., April 8-11, 1930.

All labial and lingual arches are 19 g.; loop springs, 21 g.; U-spring, 23 g.; anterior bands, 0.003″ thick; molar bands, 0.005″ thick; No. 3 silk ligature was used throughout. Black thread was used here for photographic purpose.

THE CAST GOLD RETAINER*†

By Harry H. Sorrels, D.D.S., Oklahoma City, Okla.

THE cast gold removable retainer is offered as a refinement over the commonly used vulcanite retainer, so popular a few years ago and still extensively used by many.

The advantages of the cast retainer over the vulcanite are:

1. It reduces the entire bulk of the appliance more than ten times.

2. It eliminates the vulcanite palate.

3. It is a tooth-bearing appliance and does not impinge on soft tissue.

4. Its wide range of size; it can be made from single tooth retainer to full maxillary or mandibular arch retainer.

5. It reduces operating time, as it consumes only the time necessary to take a good Solvite plaster impression, provided it is sent to a laboratory for casting.

6. It is easy to repair if it is broken, because the operator has the original Coe metal model to fit it over.

STEPS IN CONSTRUCTION

1. Solvite plaster impression.

2. Sections placed together in original impression tray.

3. Parts waxed together.

4. Poured in Coe metal model.

5. Casting impression taken off Coe metal model.

6. Appliance designed and waxed up on casting model to meet requirements of case. Care should be taken to keep appliance free from occlusion; however, small occlusal rests should be made in molar region to prevent appliance from being pushed gingivally on soft tissues in act of mastication.

Fig. 1.—Shows lingual surface of a casting model with pencil markings to indicate place where 18 gauge sprue wire should be adapted for casting.

Note that the casting is carried from the lingual to the labial surface, distal to the canine; however, if occlusion does not permit it to go through there, place it wherever it is favorable. Occlusal rests are necessary if the case extends far distally.

Fig. 2.—Shows labial designing of appliance to meet individual requirements.

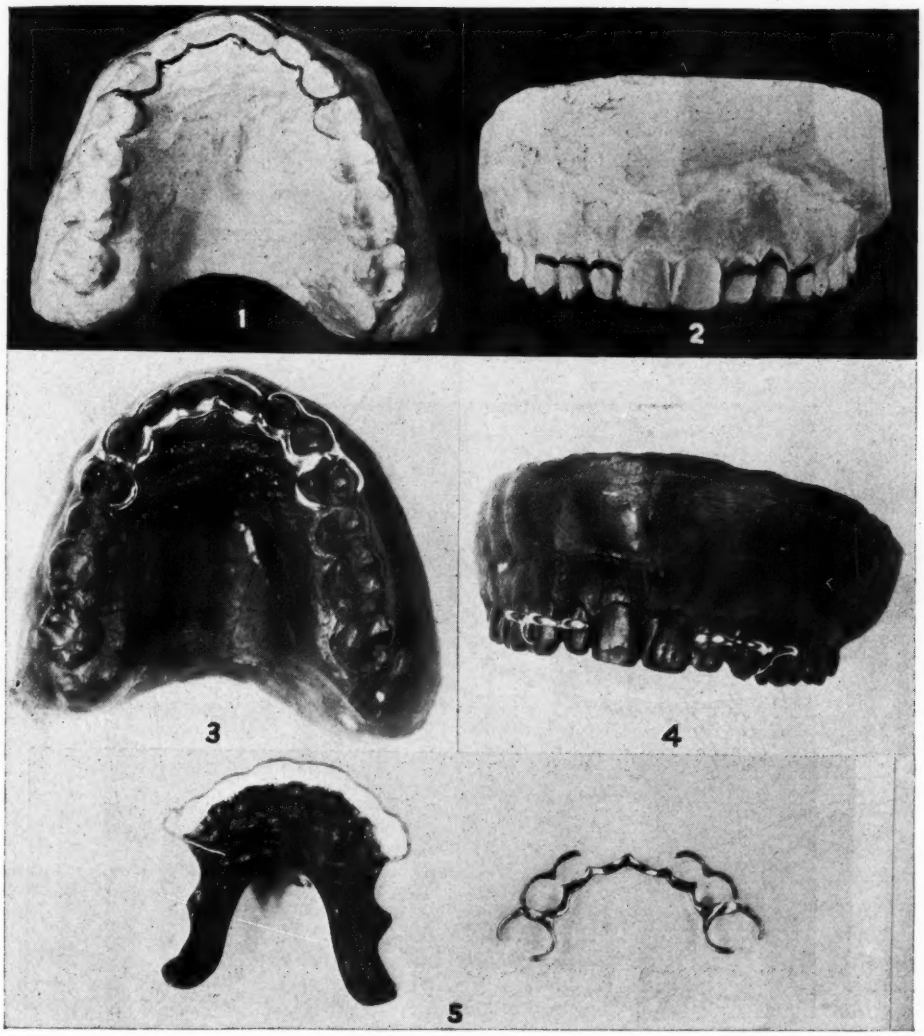
*Clinic presented at the Twenty-ninth Annual Meeting of the American Society of Orthodontists, Nashville, Tenn., April 8-11, 1930.

†Given before Southwestern Society of Orthodontia, Oklahoma City, Okla., February 24-26, 1930.

Fig. 3.—Shows lingual surface of retainer on Coe metal model.

Fig. 4.—Shows labial surface of retainer on Coe metal model.

Fig. 5.—Shows old vulcanite retainer and the refined cast gold retainer in contrast.



APPLIANCES SHOWING SECURE FORCE CONTROL FOR LINGUAL MOVEMENT OF INCISORS AND BUCCAL MOVEMENT OF CANINES AND PREMOLARS*

By Harvey A. Stryker, D.D.S., Santa Ana, Calif.

THE principles involved in the construction and application of the maxillary appliances represented in this clinic are original with Dr. James D. McCoy.

The mechanism illustrated in the maxillary arch requires very little attention and infrequent adjustments. It provides a secure means of force

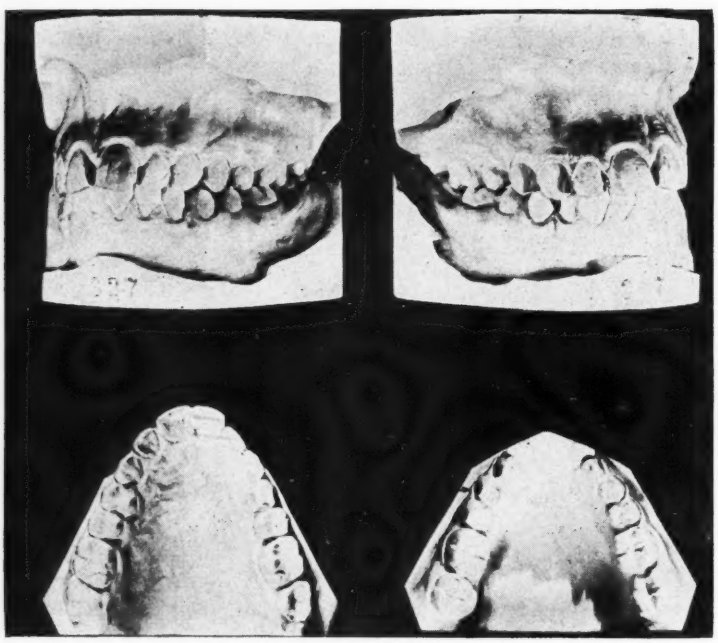


Fig. 1.—Showing views before treatment.

control. The principle of force application is positive, mild and constant in character. The mechanism is free from the numerous auxiliary attachments characteristic of most appliances. It is, therefore, comfortable to the patient and easy to keep clean.

A case from practice will be used to illustrate the construction, application and manipulation of the appliances.

The patient was a girl twelve years of age. Sectional modeling compound impressions were taken and casts completed (Fig. 1). Classification was neutroclusion. Changes indicated in the maxillary arch were buccal move-

*Clinic presented at the Twenty-ninth Annual Meeting of the American Society of Orthodontists, Nashville, Tenn., April 8-11, 1930.

ment of molars, premolars and canines, and lingual movement of the incisors with changes in their inclination. The mandibular arch required general development.

The making and the placing of appliances were carried out as follows (Fig. 2). Anchor bands 0.007 of an inch in thickness and 0.18 of an inch in width were fitted to the first permanent molars. Half-round tubes were soldered on the lingual surfaces of these bands. All four anchor bands were placed in position. Attachment bands were fitted to the canines, and open tube attachments soldered to their labial surfaces. A sectional modeling compound impression was taken of the maxillary arch with the molar and canine

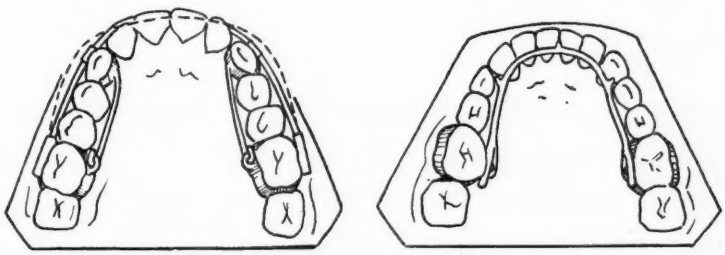


Fig. 2.—Illustrating the appliances used. Dotted line indicates how arch wire was conformed to produce the desired change in arch form.

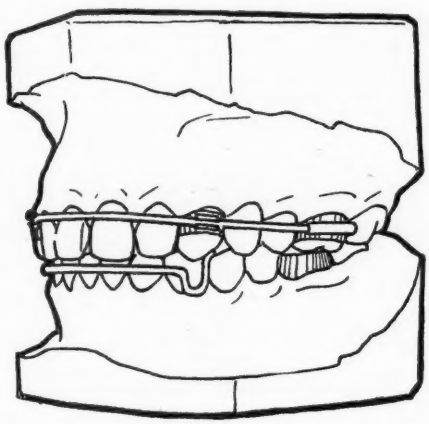


Fig. 3.—Labial view of appliances. In many cases it is necessary to include attachment bands on the lateral incisors to prevent their rotation.

bands in position. An impression was also taken of the mandibular arch to include the molar bands. Artificial stone casts were made from these impressions. Small eyelets, sufficient in size to accommodate 0.030 wire were soldered at convenient points on the mesiolingual angle of the maxillary bands. A 0.030 wire was conformed to engage in the eyelets, forming a pivotal attachment, extended forward and soldered to the lingual surfaces of the canine bands. Buccal tubings having a diameter sufficient to accommodate a 0.030 arch wire were soldered in a parallel position to the buccal surfaces of the molar bands. A labial arch wire was conformed and sprung to position in the open tube attachments on the canine bands and made passive by heat treatment. Vertical pins were soldered on the labial arch wire at points just distal to the open tube attachments. The arch wire in front of the buccal tubings was left free.

In the mandibular arch a lingual wire 0.038 of an inch in diameter was adapted closely to the lingual surfaces of the teeth and made passive by heat treatment. Stabilizers were soldered at convenient points to accommodate springs.

All appliances were removed from the models and the four anchor bands cemented. In the maxillary arch the canine bands with lingual extensions were cemented after the free ends of the extensions in the eyelets on the molar bands were first engaged. The labial arch wire was gently fastened in the open tube attachments. The lingual arch wire was also placed and left passive.

After the patient had become accustomed to the appliances, the maxillary arch wire was removed and modified slightly in form as illustrated in

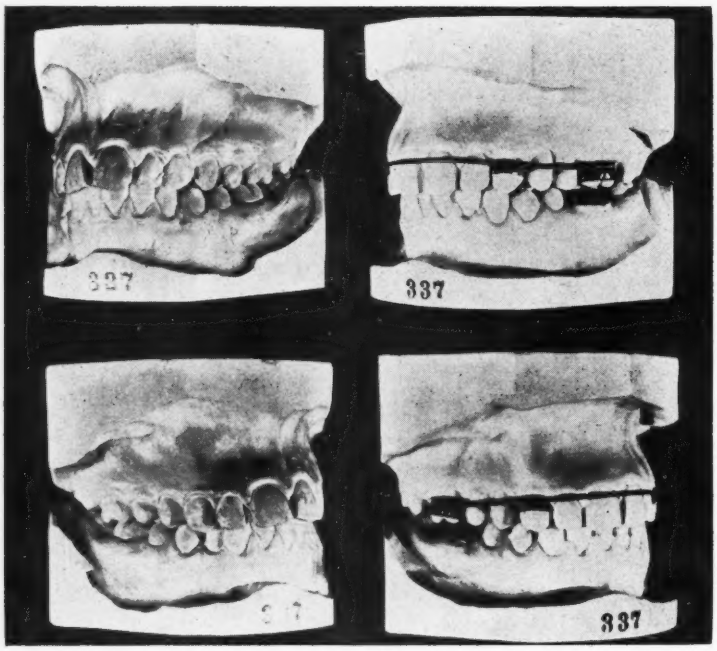


Fig. 4.—Casts on the right show the case after seven months of treatment. Note the change in the inclination of the maxillary incisors.

Fig. 2, it being made more flat across the incisal segment and rounded in the region of the canines. The action following this adjustment was to exert pressure buccally upon the canines and premolars through the lingual wire extensions and pressure in a lingual direction upon the incisors. The vertical pins previously soldered to the labial arch at points distal to the open tubes on the canines were instrumental in preventing tipping of the canines during movement. As the labial arch wire moved distally through the buccal tubes, the incisors were not only moved lingually, but a decided change was made in their inclination. Adjustments to the labial arch wire were made on an average of once a month.

Coincident with these changes, general development of the mandibular arch was obtained through the use of compound recurved springs. However,

it was necessary to place a labial extension from the lingual arch wire in order to rotate the lateral incisors (Fig. 3).

Primary treatment in this case covered a period of seven months. The change made in the inclination of the incisors is shown in Fig. 4. The appliances illustrated were those used in treatment. Fig. 5 shows occlusal views of the case at the beginning and at the end of seven months of treatment.

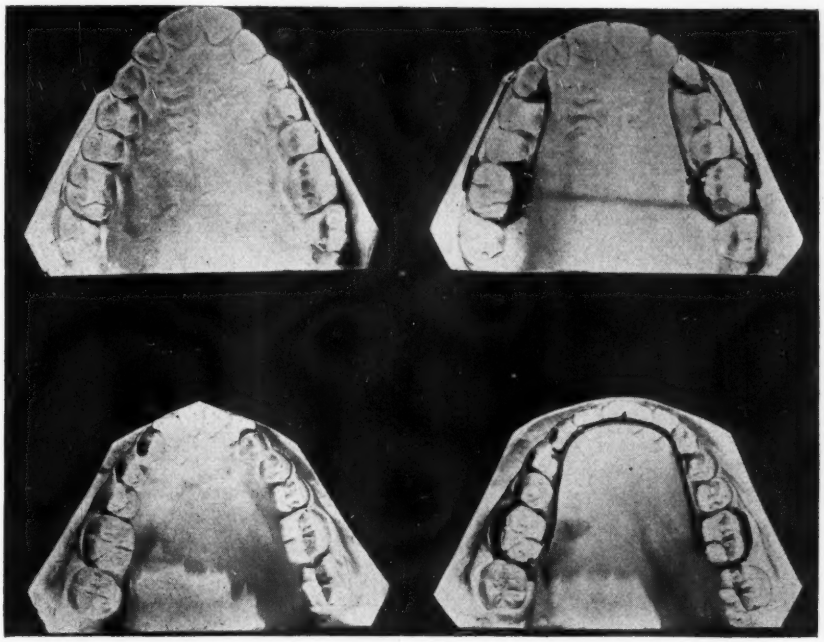


Fig. 5.—Occlusal views before and after treatment. These appliances were used in treatment.

Secondary treatment appliances consisted of a Hawley appliance in the maxillary arch and a soldered retainer from one lateral to the other in the mandibular arch. These retainers are in position at this time. The patient has been instructed to wear the Hawley appliance at night only, and at the end of one year it will be discontinued. The lateral to lateral retainer in the mandibular arch is soon to be replaced by a canine to canine retainer which will not be permanently removed until proper disposition is made of the mandibular third molars.

A PRACTICAL LINGUAL TUBE WITH NONINTERFERING LOCK AND A UNIVERSAL BUCCAL TUBE*

By Harry E. Kelsey, D.D.S., F.A.C.D., Baltimore, Maryland

THE square buccal tube and the rectangular lingual tube and lock here described are of such universal application that they commend themselves to those desiring standardization of appliances.

THE LINGUAL TUBE

The lingual tube, being rectangular, offers a broad surface on the anterior and posterior walls, and if accurately made of hard platinous gold alloy will,

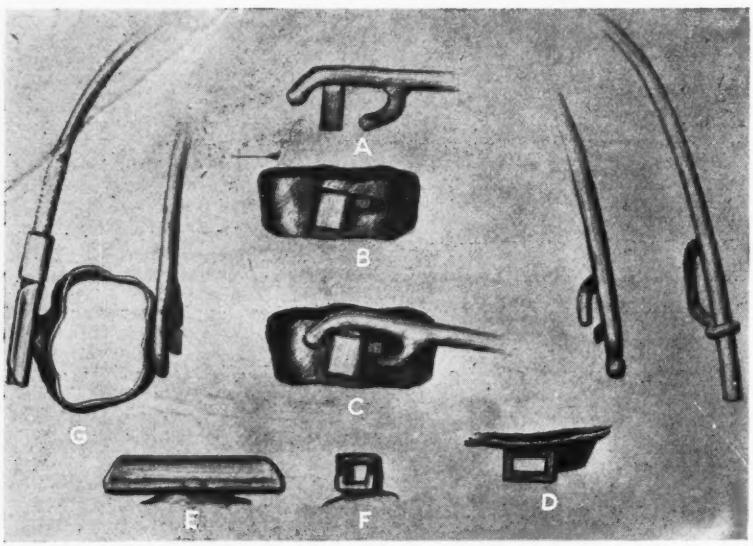


Fig. 1.—*A*, End of arch with post and lock. *B*, Molar band with tube and lug in position. *C*, Band with tube and end of arch locked in position. *D*, End view of lingual tube and lock lug. *E*, Square buccal tube, side view. *F*, Square buccal tube, end view. *G*, Molar band with lingual arch attached in position and labial arch with square end. Opposite side shows arch with round end and loop stop.

with a suitable fitting post, provide a permanently firm and tight attachment for any desired appliance.

The lock which is similar in principle to the one in general use is, however, much stronger, because a shorter piece of wire can be used, and a still greater advantage is the fact that especially in young cases where the gums are high on the teeth, the lock wire engages under the lug in front of the occlusal end of the tube instead of being pressed into the gum below the gingival end. It is made of 14-karat gold alloyed with pure silver, 0.032 in size. This will permit locking and unlocking by turning the wire lingually

*Read at the twenty-eighth annual meeting of the American Society of Orthodontists. Estes Park, Colo., July 16-19, 1929.

from under the lug eight to twelve times. If it is necessary to remove the appliance oftener than that, a new lock wire may be soldered to the arch in a moment. This wire is strong but almost entirely without spring and will stay put when pressed under the lug.

When properly made, the post should fit the tube so accurately that it is difficult to withdraw. An advantage of this lock is that a small instrument, like a screw driver, can be inserted between the lug and the arch where it joins the post, and by giving a turn the post can be easily elevated from the tube. A pair of pliers with long beaks curved somewhat like the letter S facilitates the seating of the post in the tube, at the same time pressing the lock wire snugly up under the lug.

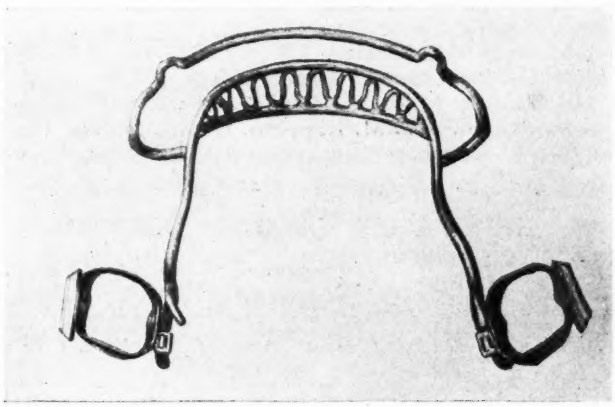


Fig. 2.—Showing molar bands with square buccal tubes and filigree bite plane attached to lingual arch with labial auxiliary wire, the appliance being attached to molar bands by means of rectangular lingual tubes with lugs and soft wire locks.

THE BUCCAL TUBE

The buccal tube is 0.036 inside measurement with a sufficiently heavy wall to withstand the usual masticating stresses that appliances encounter in the mouth. It is made of hard platinous gold alloy. The square 0.036 wire which fits it permits of a stationary buccolingual anchorage, or if opposed to the tooth of the opposite side, will produce a bodily expansion of these teeth rather than a tipping movement. If tipping on both sides of the teeth is desired, a round 0.036 arch may be used which will rotate in the tube. It is adapted to the use of all forms of jacks for closing spaces or for opening them. When used with the square arch ends, it of course will not rotate when springs are attached to it or the nut on it is turned even though it is being used on one side of the mouth only.

DEPARTMENT OF ORAL SURGERY, ORAL PATHOLOGY AND SURGICAL ORTHODONTIA

Under Editorial Supervision of

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NEOPLASMA OF THE MOUTH*

By Harry M. Seldin, D.D.S., New York, N. Y.

Director of Division of Dentistry, Department of Hospitals, City of New York

CANCER of the mouth is more prevalent than is ordinarily assumed, and the mortality from it is very great. In spite of the fact that lesions of the mouth are so readily visible and accessible, many cases of early malignancy are not recognized in time or are allowed to pass unnoticed by the dentist until they have developed into hopeless cases. No other part of the body offers such a fertile field for study of precancerous lesions as does the mouth, and, therefore, it is the duty of every dentist to become familiar with and be able to recognize the various forms of neoplasms which appear in the mouth, especially the early or incipient forms of cancer, for the earlier such conditions are recognized the greater are the possibilities of effecting a cure.

Though the etiology of cancer is quite obscure, certain facts, however, tend to show that in nearly all cases of carcinoma of the mouth, irritation from sharp, irregular, ragged or misplaced teeth, or ill-fitting restorations is, along with an associated infection, the most frequent causative agent in producing such lesions. Poor mouth hygiene and tobacco provide an additional source of irritation. From his observation of a large number of mouth lesions seen yearly in the Radiation Therapy Clinic at Bellevue Hospital, Dr. Kaplan is of the opinion that in every case of cancer of the mouth there were present associated dental lesions. This constant irritation of existing bad dental conditions promotes the development of oral cancer, while the lack of proper nutrition is a contributory cause.

*Presented in the form of a lantern slide clinic at the sixtieth annual meeting of the New Jersey State Dental Society, Asbury Park, April 30, May 1 and 2, 1930.

To many of the earlier writers syphilis and cancer were correlated, but the present workers in this subject feel that syphilis is not always the necessary direct causative agent for cancer of the mouth.

A neoplasm is a new tissue formation which is produced by the lawless proliferation of cells of normal type. It does not follow the definite plan of growth but grows independently of its surrounding structures. The cells cease to be altruistic and become egoistic.

There are two types of neoplasms: (1) benign tumors; (2) malignant tumors.

In benign tumors the tissue departure from type is slight; it is homologous or mature. They resemble fully formed tissue, do not involve the lymph nodes or invade distant tissue, do not metastasize or cause systemic disturbances, and do not tend to recur after complete removal. Histologically they are rich in fibers and poor in cells. They rarely ulcerate. They destroy adjacent tissues by weight, pressure or hemorrhage.

In malignant tumors the tissue departure from type is considerable; it is heterologous or immature. They are rapid growths which originate in one type of tissue and while retaining that type invade and replace others. They metastasize and tend to recur after removal and produce cachexia by interfering with nutrition. Metastases or development of secondary nodules in proximal or remote portions of the body occur through the lymphatics as in carcinomata or via the blood stream as in sarcomata. Histologically malignant tumors are poor in fibers and rich in cells. They are soft and spongy and tend to ulcerate and destroy by infiltration and destruction of the surrounding tissue.

It is customary to terminate the name of a neoplasm with the suffix "oma." This is preceded in most cases by the name of the tissue from which the growth has originated, i.e., osteoma, bone tumor, etc. If a neoplasm contains more than one kind of tissue, the principal constituent is placed last, i.e., an osteofibroma is a fibroma containing some bone.

Tumors may be further classified according to the tissue from which they originate.[1]

1. Epithelial tumors
    - (a) Benign
        - Papilloma
        - Adenoma
        - Adamantinoma
    - (b) Malignant
        - Epithelioma (cancroid or squamous-cell carcinoma)
        - Basal-cell carcinoma (rodent ulcer)
        - Adenocarcinoma (cylindrical cell, columnar cell or malignant adenoma)
        - Scirrhous carcinoma (hard or fibrous)
        - Carcinoma simplex (equal amount of parenchyma and stroma)
        - Medullary carcinoma (soft encephaloid)

2. Connective tissue tumors
   (a) Benign
      Fibroma, myxoma, lipoma, chondroma, osteoma, neuroma, myoma, angioma (hemangioma, lymphangioma), giant-celled tumors
   (b) Malignant
      Mixed-celled sarcoma, fibrosarcoma, liposarcoma, osteosarcoma, myxosarcoma, chondrosarcoma, lymphosarcoma, small round-cell sarcoma, large round-cell sarcoma, spindle-cell sarcoma, alveolar sarcoma, melanotic sarcoma, endothelioma
3. Mixed-cell tumors
   (a) Fibromyoma, myxochondroma
   (b) Mixed-cell tumors of salivary glands
4. Embryoid tumors
   (a) Teratoma

Lesions are not diagnosed as to the microscopic picture alone; the clinical appearance is of great aid. The following are clinical forms most often diagnosed:

Epulis is a clinical term including all tumors about the gums.

There are three types: (1) benign giant-cell sarcoma (not true giant-cell); (2) fibrous epulis; (3) fibro-angiomatous epulis.

Papillomata are tumors composed of hypertrophied papillae covered with thickened epidermis. They often ulcerate, are found mainly at the edges of the lip and occur also on the cheeks, gums and tongue. Treatment is surgical removal by scalpel or by electrothermy.

Adamantinoma is a multilocular cyst, a benign tumor arising from the dental epithelium and occurring mainly in the mandible. It is composed of solid cystic anastamosing alveoli, separated by fibrous connective tissue. According to Bland-Sutton they arise from persisting portions of the epithelium of the enamel organ. Some authorities derive them from Malassez's epithelial débris.

Osteitis fibrosa is a tumor of bone resembling the giant-cell sarcoma. There is a local destruction of the osseous tissue with the formation of new bone of spongy consistency. It can be readily cut with a knife. The bone marrow is replaced by a soft fibrous material. At a later stage there is a formation of cysts. It is then called osteitis fibrosa cystica. Histologically and radiographically it resembles Paget's disease (osteitis deformans). Clinically it is different. Osteitis fibrosa is usually localized, and the deformity of the bone is unilateral, while in Paget's disease the deformity is much greater and the entire maxilla is involved and the disease may involve other bones of the body. It is usually benign but it may become transitional and turn into malignancy.

Leucoplakia are whitish-gray patches found on the mucous membrane of the mouth, most frequently on the cheeks. They may also occur on the tongue

and on the mucous membrane of the lips. It is a chronic inflammatory disease of the mouth. When these patches are of long standing they become thickened and wart-like. The etiology is somewhat obscure, but a luetic background and a chronic irritant, such as tobacco, are its most common causative factors. These patches may become wart-like, fissured and finally may ulcerate. They are then, according to Kaplan, true precancerous lesions. Ewing found that more than 30 per cent of the cancers under his observation were preceded by leucoplakia. Microscopic examination shows an abnormal growth of epithelial tissue with hornification of the superficial layers.

Treatment.—If luetic, prescribe antiluetic treatment. Remove all irritants, such as tobacco and poor dental restorations. If the patches are thickened and wart-like, removal with the high frequency coagulation current is indicated.

Hemangioma of Pregnancy.—This is not a true tumor. It is a hypertrophy or overgrowth of the blood vessels of the gums, which occurs during pregnancy and disappears soon after the child is born. It has an important relation to the general disturbance involving the bone forming tissue and calcium metabolism.

Treatment.—Mouth hygiene. If the hemangiomata become too large and annoying, they may be removed by electrothermic methods.

Carcinoma.—This type of malignant tumor is of epithelial origin. It has a tendency to infiltrate the surrounding tissues and to metastasize. It is found usually in people over thirty years of age, who give a history of some sort of chronic irritation such as rough, ragged teeth, pipe smoking, etc. When allowed to reach a large size there may be bone involvement. The older the individual is, the less malignant the growth, while the younger the person the more malignant the growth.

According to Kaplan, cases involving the tongue, floor of the mouth and lower gums are more malignant than those of maxilla and cheek. The growth begins as a small papillary lesion which ulcerates rapidly or as a thickening of the surface epithelium, leucoplakic and wart-like. The cervical lymph glands are usually involved in the early stages. In appearance the lesion resembles a mushroom growth with an indurated base and edges inverted and raised.

The cancer is liable to metastasize by way of the lymphatics, through which the advancing cancer cells at the periphery make their way. Groups of these cells travel along the lymphatic system and may lodge in the adjoining lymph nodes where secondary malignant swellings develop. Carcinomata are liable to degenerate and the associated infection makes the lesion appear worse.

Sarcoma.—This is a malignant connective tissue tumor in which the cells predominate and has an insignificant amount of intercellular substance. In contradistinction to carcinoma, it is a malignancy of early adult life. It is vascular and tends to metastasize through the blood stream. It starts in the connective tissue of mouth, bone and periosteum and may invade the antrum. Microscopically sarcomata can be divided into small round cell, large round

cell and spindle cell types. These tumors have a tendency to spread and invade the adjacent tissues, involving the bone and gums.

TREATMENT OF MALIGNANT ORAL LESIONS

There are definite technics and treatments to be applied toward the cure of malignant oral lesions, but I shall not include them in this paper, since I do not advocate their use by the dentist. No dentist or dental specialist should attempt to treat malignant lesions in the cavity, no matter what the extent of his knowledge or experience may be. Such forms of pathology often continue to an unfortunate climax in spite of all therapeutic measures. It is infinitely wiser to refer all such malignant and suspected malignant growths to a competent physician specializing in that particular branch of medicine. In so doing, the dentist discharges his obligations and at the same time renders an invaluable service to his patient. The keynote of the dentist's responsibility in this matter of mouth lesions is recognition. Doubtful cases must always be regarded guilty until proved innocent.

Never extract teeth or do any surgery until all radium reaction has worn off, as necrosis is bound to ensue if this precaution is not heeded. There is always a reaction, often accompanied by sloughing after radium, which lasts for a period of over six weeks.

Biopsy.—Much controversy arises as to the advisability of taking a biopsy. Ewing, Kaplan and Bland-Sutton are in favor of biopsy, and are of the opinion that it is harmless when properly done. The taking of the biopsy can be made painless by the use of anesthesia. In soft tissue malignancies the biopsy can be taken by electrothermic methods. It is essential to send all removed tissues to the pathologist for confirmation of diagnosis.

In the majority of cases of malignancy the lymph glands are enlarged. There are, however, exceptions, and not all these secondary swellings are malignant. Dr. Simmons[3] reports nine cases of nonpalpable lymph glands, two of which were cancerous.

CONCLUSION

Malignancy of the mouth is common and reports for treatment first to the dentist. It is the duty of every dentist to become familiar with and to be able to diagnose neoplasma of the mouth, especially in their early stages and precancerous conditions.

Favorable prognosis of malignancy depends upon its early recognition and treatment. Carcinoma of the mouth is always associated with some source of irritation and poor mouth hygiene. If there is any doubt as to diagnosis, take a biopsy and send it to a competent pathologist. Before sending the patient for radium treatment place the mouth in an hygienic condition and remove all sources of dental irritation. A good deal of harm can be done with radium improperly used. The treatment of cancer should not be attempted by a dentist or a dental specialist but should be referred to a physician specializing in that branch of medicine. The rôle of the dentist in mouth malignancies should be confined to its recognition and to the removal of possible causative factors in the form of bad teeth and dental restorations.

I wish to express my appreciation to Dr. Ira I. Kaplan, Director of the Division of Cancer, Department of Hospitals, and Dr. Charles G. Darlington, Professor of Pathology, N. Y. U., College of Dentistry, for their many valuable suggestions and their assistance in the preparation of this paper.

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REPORT OF OPERATIVE CLEFT PALATE CASE OF DR. VILRAY P. BLAIR, WITH ORTHODONTIC INTERFERENCE*

By Dr. H. C. Pollock, St. Louis, Mo.

SOME one has said during one of our previous meetings that our failures or uncompleted orthodontic cases, as some choose to call them (where they are described as case histories), are just as valuable and possibly more so for the practical advancement of our specialty, than are our outstanding successes. Therefore, with this proposition before me as an inspiration, there is being presented to you today a prolonged treated, mutilated case which from an orthodontic standpoint might *not* be classed as entirely successful as a practical procedure, however, from a surgical standpoint, quite to the contrary.

Who is it who having practiced orthodontia over a period of years, at times has not been more or less puzzled, further even distracted, and at a loss to know just what to do with operated, cleft palate cases which are from time to time presenting themselves to the orthodontist for his suggestions, his treatment and for further improvement of the dental architecture as a whole?

The surgeon involved in the case is anxious of course to improve the esthetic facial appearance of his patient to the greatest extent possible; furthermore, he is consistently equally anxious to establish or resurrect, as it were, some kind of a serviceable and functioning masticating apparatus for his patient, which will serve the purpose of the masticating function over a long period of years. Over the experience of a number of years, many orthodontists, I feel sure, have found these cases (while some creditable results have been reported) are experimental in nature. The tissue involved has been operated, tooth buds have been mutilated; the osseous tissue disturbed, subjected to trauma by operation, does not react to orthodontic treatment in a normal and satisfactory way which all makes the possible results more or less a conjecture, in the hands of most of us at least.

The surgeon's attitude and his perspective of these cases seem to be that each case is a distinct problem in its own, that in order to be of any service to the patient much ingenuity is sometimes necessary in the devising and scheming of artificial devices which may be of service to him. The tissue is usually so badly mutilated from a dental standpoint that the ordinary processes and methods of creating artificial dentures and securing them to place are inadequate, and cannot be applied in the case.

The premaxilla is ofttimes shifted in its position to the point that wide expansion or growth is necessary in order to accommodate a denture which will supply any kind of serviceable occlusion with the mandibular teeth. The orthodontist, on the other hand, is out of his usual field and element into a

*Read at the Twenty-ninth Annual Meeting of the American Society of Orthodontists, Nashville, Tenn., April 8-11, 1930.

new, more or less chaotic and abnormal one in which he is not accustomed to working. Therefore he does not know just what he can expect from his treatment. The unfortunate part of it all is that he is unable to find out until a period of months or years have elapsed.

In reporting this case today by means of the lantern slides which are to follow, I believe I am reporting a type of case which it has been the experience of many orthodontists to treat from time to time, and if observations and comments are made upon the merits of orthodontic treatment in these cases, it is based upon the experience not only of having treated a number of cases of this type myself but also upon the experience of others who have treated a number of the same type and upon the experience of surgeons with a background of many years of surgical treatment of cleft palate followed by orthodontic effort and experiment.

Fig. 1.—Original cleft palate, subsequent to surgical operation and previous to orthodontic treatment.

Dr. Vilray P. Blair of St. Louis operated this case about to be shown, at the early age of eight days, on November 29, 1912. The following is an excerpt from Dr. Blair's report:

"Approximated the maxillae and closed the alveolar part of a through and through single harelip and palate cleft by transfixing the maxillae with wires after the general plan called the 'Brophy Operation'; at the same time closed the lip cleft by 'Modified Owen Operation.'

"May 19, 1913: Closed the palate cleft by mucoperiosteal flaps called the 'Von Langenbeck Operation.' Nothing out of the ordinary noted about the case at this time.

"December 29, 1919: Reported for observation. Very short and narrow upper jaw. Has one upper central incisor and two six year molars; all other upper teeth are simply stumps. Septum deviated to the left obstructing the

left nostril. Complains of headaches. Upper lip is scarred and flat but in pretty good shape. External nose is good."

It was the observation of this and of occasional similar results in his own practice and that of other surgeons that has caused Dr. Blair to abandon entirely the plan of putting wires through and forcefully adjusting the cleft maxilla. For reference see "Mirault Operation for Single Harelip" which appeared in the July issue of *Surgery, Gynecology and Obstetrics.*

"March 28, 1924: Reports for observation. Upper molar teeth occlude lingually of the lower. Upper jaw comes together in a point in front and the upper incisor which she has is fully 1 cm. behind the lower incisors. Palate is rather short but can say 'K' and 'boots and shoes'; cannot say 'T,' says

Fig. 2.—Subsequent to treatment and subsequent to operation releasing the lip for the purpose of inserting artificial denture.

'key' for 'T.' Lip can be pulled forward to good position. Slight cleft anteriorly; cannot be seen but felt. Recommend that molars and bicuspid teeth be expanded to proper position and that she have a denture for the anterior teeth.

"July 3, 1925: Reports for observation. Upper molars have been spread laterally to meet the lower molars. Anterior part of maxilla still crumpled and the teeth are erupting.

"October 16, 1925: The soft tissues of the lower part of the nose, upper lip and the cheeks were advanced by making an incision that separated the cheeks and lips from the maxilla and the columella from the nasal septum and sutured all of these soft tissues in an advanced position in relation to the supporting structures. At the same time a better adjustment was made of the

lip scar and of the nostril on the cleft side. This is a standard operation we do on unsatisfactory repairs.

"November 16, 1925: Lip and nose in good position. Upper lip, though short from side to side, is not deformed. There is enough room under the lip for wearing incisor teeth in the proper position. If lip should be too tight to

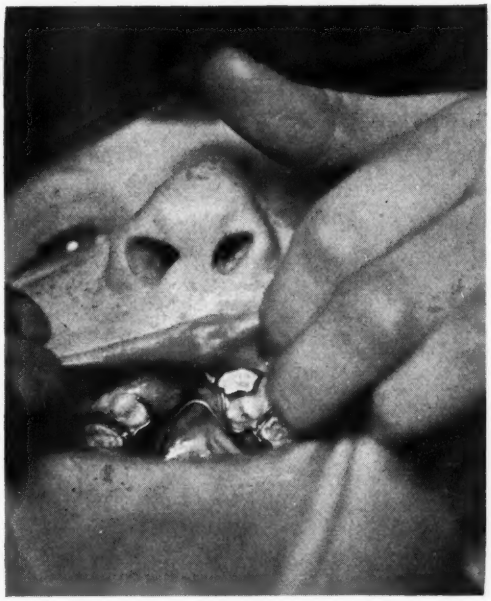

Fig. 3.—Orthodontic appliance used for the expansion of the maxillary arch.

Fig. 4.—Close-up of case after maxillary denture had been inserted by Dr. Brown.

wear a prosthesis that will hold it out in its proper position, it can be further released with a Thiersch graft. There is a wide opening between the oral and nasal pharynx, but she can blow out of mouth without any coming out of nose (tested with smoke).

"August, 1929: Dr. J. A. Brown put in a prosthesis carrying teeth that articulate with their fellows in the lower jaw in the incisor, cuspid and bicuspid regions."

ORTHODONTIC REPORT

Treatment was started April 1, 1924, with the general plan and outline in mind of expanding the maxillary arch in order to establish occlusal relations of the buccal teeth to bring forward all of the anterior maxillary teeth in order to place them out over and in advance of the mandibular teeth. Patient was treated over a period of two years at average intervals of two weeks and was treated during this period by three different operators.

The type of appliance used was the fixed removable with auxiliary finger springs and attachments. In the later stages of treatment an Angle ribbon was used upon the anterior teeth in order to attempt to bring the segment forward parallel to the long axis of the teeth rather than to tip them. To continue then with this case history and in order to focus our viewpoint let us continue with the slides showing the case in the various stages of its history. (Slides were shown.)

Orthodontic treatment was discontinued May 14, 1926.

STERILIZATION FOR SURGERY OF THE MOUTH

By Sterling V. Mead, B.S., D.D.S., M.S., Washington, D. C.
Director, Research Department Dental School, Georgetown University

(Continued from page 1115, October issue.)

HOSPITAL STERILIZATION

In order to show the variation of methods of sterilization, information was obtained from seven of the leading hospitals of Washington, and the following data were obtained:

Georgetown Hospital

Instruments: Boiled forty-five minutes.
Knives: One hundred per cent lysol for one hour.
Hands: Scrubbed seven minutes with green soap. Hand solution—Harrington solution.
Gloves: Autoclave twenty minutes under fifteen pounds of pressure.
Packs and Small Goods: Autoclaved forty-five minutes under twenty pounds pressure.
Needles: Boiled.
Syringes: Boiled with instruments for immediate use. Autoclaved for twenty minutes under fifteen pounds pressure.

Garfield Hospital

Instruments: Boiled in steam sterilizer for twenty minutes. Scissors also boiled with instruments.
Knives: Boiled one minute and soaked in alcohol twenty minutes (75 per cent alcohol).
Hands: Green soap made with water, hand solution, alum and alcohol.
Gloves: Autoclave for fifteen minutes under fifteen pounds pressure.
Packs and Small Goods: Thirty minutes under thirty pounds pressure.
Needles: Boiled for three minutes and soaked in 75 per cent alcohol for twenty minutes.
Syringes: Wrapped in gauze, boiled for five minutes, and soaked in alcohol for twenty minutes.

Sibley Hospital

Instruments: Boil twenty minutes.
Knives: Boil five minutes or longer.
Hands: Scrub with green soap for five minutes. Hand solution—alcohol.
Gloves: Boil ten minutes, use sterile field to dry, and powder gloves.
Packs and Small Goods: Autoclave thirty minutes under twenty to twenty-five pounds pressure.
Needles: Boil five to ten minutes for emergency use. Kept in alcohol.
Syringes: Boil ten minutes or longer.

Providence Hospital

Instruments: All dirty instruments are washed in a weak solution of lysol, put into trays, and wet sterilized twenty to thirty minutes—this is done to all instruments. At the end of the day those instruments are oiled, sorted, and put into packs, wrapped in double towels, and dry sterilized for one hour. Instruments used during the day for other operations are wet sterilized and taken to the operating room in trays.

Knives: Are soaked in a straight solution of lysol overnight, washed in sterile water, and carefully dried. Those used again during the day are boiled for three minutes (five minutes for scissors).

Hands: Green soap made with water and sterilized. Scrub hands (each hand five minutes) with soap and plenty of water, keeping in a position that the water runs off the elbow. Go through solutions after scrubbing.

Hand Solutions

1. Sterile water with one ounce of 7 per cent iodine to approximately one gallon of water.
2. Plain sterile water.
3. Alcohol.

All hand solutions are put in sterile basins.

Gloves: Are thoroughly washed and dried, very carefully looked over and mended, powdered, put into separate packs or major packs which contain four pairs of gloves, for operator, two assistants, and one nurse. These are sterilized for fifteen minutes to twenty minutes under eighteen to twenty pounds pressure.

Packs, etc.: All goods, such as gowns, towels, sheets, dressings, etc., are autoclaved for one hour under twenty pounds pressure.

Needles: Cleaned by drawing water through them, then peroxide, and put into albolene in test tubes and autoclaved for twenty minutes.

Syringes: Hypodermic syringes cleaned with water boiled for twenty minutes.

Transfusion Set: Thoroughly cleaned with water and peroxide, boiled, wrapped in towels, and autoclaved for one-half hour.

EMERGENCY HOSPITAL

Instruments: To start the day all instruments are autoclaved in sets, twenty minutes under twenty pounds pressure. Extra instruments, wet sterilized twenty minutes (boiling water). All instruments are washed in cold water and boiled for ten minutes, unless they are going to be used for another operation, then they are boiled twenty minutes.

Hands: Scrubbed with green soap made with water. Hand solution—bichloride, sterile water, and alcohol.

Gloves: Washed in lysol, dried, patched, powdered, and packed separately. Sterilized twenty minutes, fifteen pounds pressure.

Packs, etc.: Packs and small goods autoclaved thirty minutes under twenty pounds pressure. Never used after left standing over forty-eight hours, resterilized.

Hypodermic Needles: Boiled with instrument.

Transfusion Needles, etc.: Autoclaved in albolene.

Syringes: Soaked from six to ten minutes in 5 per cent solution of phenol, and washed in sterile water.

WASHINGTON SANATORIUM

Instruments: Autoclaved for fifteen minutes at fifteen pounds pressure. Wet sterilized only in case of emergency, ten to twenty minutes boiling.

Knives: Autoclaved with instruments to be used for the day or boiled for five to seven minutes.

Hands: Scrubbed for ten minutes, particular attention given to hands and finger nails. Solution—cyanide of mercury 1 to 1,000 and alcohol.

Gloves: Packed separately, well powdered. Autoclaved fifteen minutes under fifteen pounds pressure.

Packs, etc.: Autoclave for one and one-quarter hours at twenty-five pounds pressure.

Hypodermic Needles and Syringes: Plunger taken out of barrel, each wrapped separately in gauze. Wire left in needle and placed with syringes and wrapped in towel, double thickness.

Deack Control, sold by A. W. Dyer of Detroit: These discs are placed in a glass container in the sterilizer. When absolute sterility is obtained, these discs turn color.

HOMEOPATHIC HOSPITAL

Instruments: Wet sterilized, boil twenty minutes to one-half hour.
Knives: Soaked in 75 per cent alcohol for one-half hour.
Hands: Washed with green soap, made with water eight to ten minutes for major operations, five to eight for minor operations. Soda and lime or alcohol.
Gloves: Boil for five minutes or autoclave for ten to twelve minutes under fifteen pounds pressure.
Packs, etc.: Twenty minutes under forty-five pounds pressure.
Needles: Boiled and placed in a container of sterile oil.
Syringes: Soak in 75 per cent solution of alcohol one-half hour.

CARE OF INSTRUMENTS

All instruments should be washed individually in a solution of lysol or lysol and green soap or in running water. After use they are brushed to remove blood, pus, and tissue residue; they should be sterilized in closed containers ready for use, or sterilized and dried and placed upon a sterile towel ready for use. Knives after brushing are autoclaved or placed in lysol and then put in Bard-Parker solution or metaphen. It is best not to boil knives, as boiling for long periods dulls the edge.

Hypodermic syringes may be washed in running water and then autoclaved or boiled. They may be cleaned by attaching to the syringe, passing water through, then detaching them and drawing a wire through the lumen. Syringes and needles should not be sterilized in liquids as is so often done. It is always possible to retain some of the sterilizing solution in the syringe or needle and inject it into the tissues.

Mirrors are brushed and autoclaved or boiled. When instruments are boiled, they are handled with forceps and placed upon a sterile towel.

All instruments should be chosen with adaptability to sterilization. Those entirely of metal or proper substitute should be used. Metal water syringes are preferable, as they are more durable for boiling.

Steel will rust if it is exposed to air in a moist condition, and it will rust more readily if it is hot and moist. Knowledge of these facts will usually suggest a remedy when unusual rusting of instruments is experienced.

The liberal use of oil in wiping off instruments before they are put away will prevent rusting, sufficiently to warrant the trouble. This does not mean that the instruments must be dripping with oil or that enough will remain on the surfaces to be more than barely perceptible. Simply substitute a piece of slightly oily cloth for a dry cloth with which they are usually wiped off. Enough oil will remain on the surfaces to protect them against rust in handling and in the pressure sterilizer.

STERILIZATION OF DENTAL INSTRUMENTS

The possibility of the transmission of disease from one person to another through the medium of instruments in dental operations should not be overlooked.

Infections through this source do occasionally occur. Anyone familiar with asepsis would have little difficulty in finding opportunity to criticize the surgical technic of the average dentist. It is not an uncommon practice for men to

sterilize instruments properly but to place them in some cabinet or drawer or some place to lie around where they can easily become contaminated. One very prominent author has this to say about sterilization in the dental office:

"Now and then one hears a dentist speak of operating in an aseptic manner. Possibly someone can do this, but I do not believe it possible and I have never seen it done. Somewhere or other there always comes a break in some link in that chain of asepsis and then the whole chain fails. . . . Dental asepsis as sometimes practiced is a veritable joke."

During the last few years sterilization has been given very careful study by the dentist. The requirements of a sterilization technic have become more exacting. Many operators contend that when operating in the mouth the field is always contaminated and that nature assists in protection; but it is not the infection in the patient's mouth about which we are concerned, it is

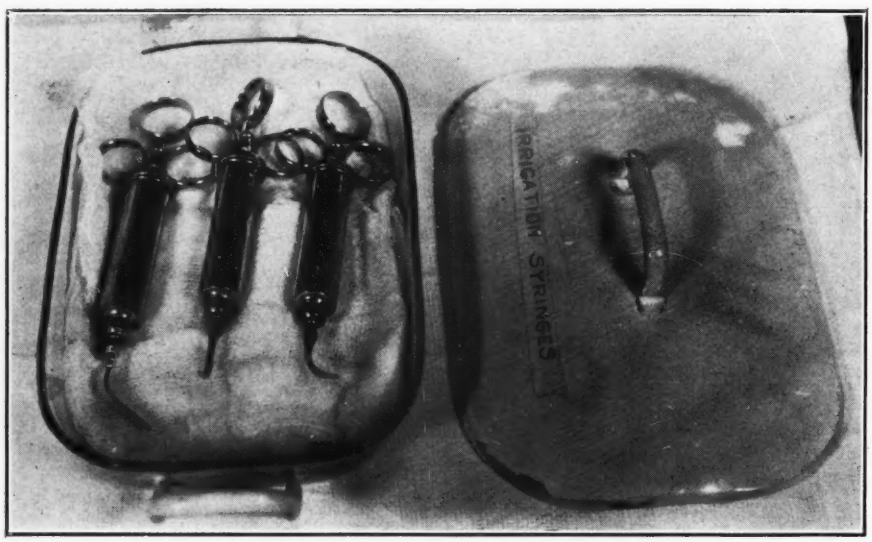

Fig. 17.—Sterile metal irrigation syringes.

the carrying in of some outside infection for which the patient might not have developed any resistance.

There is no excuse for a middle course of action. If a dentist is going to sterilize some instruments but only wipe off others, if he merely runs his hands through tap water, if he depends upon his eye to tell him in those cases after which he should sterilize his instruments, without considering differences in resistance and immunity and pathogenicity, then he might almost as well dispense with all precautions. The only way is to be sure of the absolute sterility of all the equipment, all of the time. Unfortunately, this ideal state is very hard to achieve. It means for the dentist, eternal vigilance and care; it means the expenditure of money and the loss of time. With ordinary precautions, the possibility of seriously infecting one patient from another is slight, but the fact that there is a possibility at all should be enough to induce every dentist to protect both himself and his patients from the chance of that possibility materializing into fact.

The physical processes involved in sterilization have been the subject of much research and discussion. The theories can be stated briefly as the coagulation and hydrolytic theories. The first strives to show that the cell substance of the organism is coagulated by the disinfecting agent, just as the white of an egg is coagulated by heat when cooked. The second theory claims that the death of the organism is brought about by the introduction of water into the cell substance, the consequent hydrolysis being accelerated by the disinfecting agent.

The majority of pathogenic bacteria are non-spore-bearing organisms and are, therefore, fairly easily killed. *Bacillus typhosus, Bacillus paratyphosus, Bacillus tuberculosis,* the meningococcus, pneumococcus, gonococcus, *Treponema pallidum, Bacillus diphtheriæ,* are all killed before the expiration of a ten-minute period in boiling water. The staphylococcus, the non-spore-bearing organism generally reputed to be the most resistant to heat, was found by Hasseltine never to survive boiling for three minutes. Considering this group only, the choice of a method of sterilizing dental instruments resolves itself into a selection of some system combining complete efficiency with little cost, little trouble, and a minimum of injurious effects on the instruments sterilized.

The possibility of the operator transferring infection to the cable of the dental engine above the hand piece, and then later from the cable to another patient, has been mentioned. If the cables have the power-transmitting mechanism inside a covering, this can be avoided by a simple sterile sleeve, with a drawstring in each end, which can be slipped over the cable and tied after the hand piece is in place, so that the whole cable is covered down to the sterile hand piece. This allows the operator to handle the cable at will during the operation, and, when a second patient is treated, a second sterile sleeve is put on in place of the first. This is not applicable to engines which transmit the power from engine head to hand piece by open cord belt.

In sterilizing hand pieces, heat will reach infection in parts of the instrument where cold solutions cannot be effective, on account of the oil present. With heat, the metal itself is raised to the temperature of the surrounding medium, so that the organisms are attacked from all sides; while with solutions or gasses more or less of their surface is protected.

The hand piece should be dried immediately after sterilization upon a sterile towel.

TESTS ON SURGICAL KNIVES

Some work has already been done at the Bureau of Standards on the changes occurring in martensitic steels by tempering at the lower temperatures, on the order of those used in sterilizing.

The data summarized in Fig. 18, taken from the Bureau of Standards report, No. 452, for the high carbon steel (1.12 per cent carbon) is applicable to the question of sterilization of dental instruments. The steel used in the knives upon which we made most of our tests at Georgetown is of the same general type, namely, over 1.12 per cent carbon.

The following is taken from Scientific Paper No. 452 of Bureau of Standards on *Structure of Martensitic Carbon Steels and Changes in Microstructure Which Occur Upon Tempering:*

"In Fig. 18 are shown curves summarizing the behavior, with respect to hardness changes, of three of the steels used in the investigation. Each point plotted is the average of 5 determinations, each upon approximately 20 different specimens. The steels represented are the two highest and the one of lowest carbon content. The curves for the other steels closely parallel those shown,

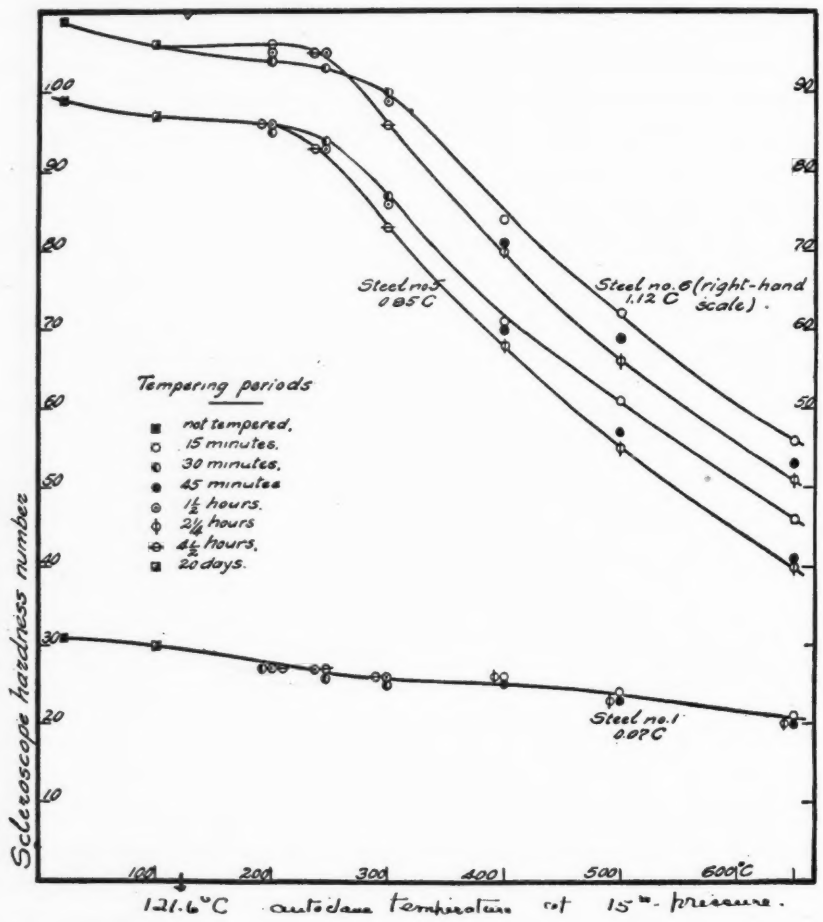

Fig. 18.—Relation between the scleroscope hardness of 0.07, 0.85, and 1.12 per cent carbon steels and the temperature and duration of tempering.

the one for steel No. 4 (0.70 per cent carbon) lying only very slightly below that of steel No. 5, and the other two somewhat lower in the order of their carbon contents. Howe and Levy have given somewhat similar curves in the report of their investigation of the hardness of eutect steel.

"The curves for the high carbon steels indicate very clearly the fact that the changes occurring during tempering at low temperatures are distinctly different from those which ensue at higher temperatures, and it is evident that no very appreciable changes in hardness result until the temperature of 250° C. (approximately) has been reached. The results of the microstructural examina-

tion are thus confirmed. The change in the slope of the curves in the range between 200 and 300° C. is so marked as to leave no doubt concerning this. . . . . When tempered at the higher temperatures—that is, above 250° C.—all the steels were found to lose their hardness rapidly and the curves become roughly linear, so that the change in hardness may be considered as approximately proportional to the increase of temperature above the 250° C. point. The effect of the tempering period is shown by the two branches of the curve, which diverge slightly as the tempering temperature is increased. In general, it may be concluded that, although the precision of the scleroscope is not very high, the results obtained in the study of the hardness changes during tempering strongly confirm the conclusions which the observed changes in the microstructure of the same steels appeared to justify. . . . .

"To summarize: The changes which occur during tempering are considered under two headings—those below and those above 250° C. The structural changes below this temperature are relatively slight and manifest themselves by the difference in the rate of etching of martensite, particularly in the steels of high carbon content, with respect to alkaline oxiding reagents."

TABLE XV

THE KNIFE EDGE IN STERILIZATION

KNIFE NO.	KNIFE EDGE GRADE						NO. GRADES CHANGE	METHOD OF STERILIZATION	AVERAGE CHANGE (NO. OF GRADES)
	BEFORE STERILIZATION	AFTER STERILIZATION							
		10 MIN.	30 MIN.	1 HOUR	2 HOURS	3 HOURS			
1	A–	A–	A–	A–	B–	C	5	Boiling in water	5¾
2	A	A–	A–	B	B–	C	6		
3	A–	A–	A–	B	B–	C	5		
4	A	A–	A–	A	B–	C	7		
6	A		A–		B	B	3	Autoclaving blade wrapped in oiled cotton	2
7	A		A		A–	B	3		
8	A		A		A	A	0		
9	B+		B+		B	B–	2		
10	A		B+		B+	B+	2		
11	A		A		B	B	3	Autoclaving	1¼
12	A		A		A	A–	1		
13	B		B		B–	B	0		
14	B		A		B	B–	1		
5	A	A	A	A	A–	A–	1	Immersion in Bard-Parker solution	1
15	A–	A–	B+	B+	B	B	2		
16	A	A	A	A–	A–	A–	1		
17	B+	B+	B+	B+	B+	B+	0		
18	B+	B+	B+	B+	B	B	1		
5	A–	A–	A–	A–	A–	A–	0	Immersion in 70% alcohol	0.8
15	B	B	B	B–	B–	B–	1		
16	A–	A–	A–	A–	A–	B+	1		
17	B+	B+	B+	B+	B+	B	1		
18	B	B	B	B–	B–	B–*	1		
19	A	A	A	A	A	A–	1	Immersion in metaphen	1.0
20	A	A	A	A–	A–	A–	1		
21	A–	A–	A–	A–	A–	B+	1		
22	A–	A–	A–	A–	B+	B+	1		

"A relatively pronounced change in structure of hardened steel occurs at approximately 250° C. The martensite and austenite, if present, are completely transformed and the steel begins to assume a granular appearance."

In order to show the changes in the cutting edge of knives and other instruments a number of thin knife blades were selected as best, because the edge is affected more quickly and more definitely in a thin fine blade than is the case with heavier knives and blades. Before sterilization the knife edges were

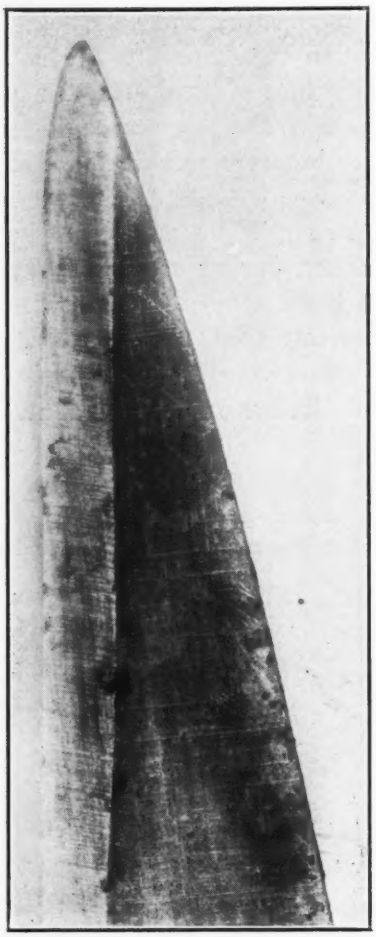

Fig. 19.—Photomicrograph of cutting edge of knife boiled for three hours.

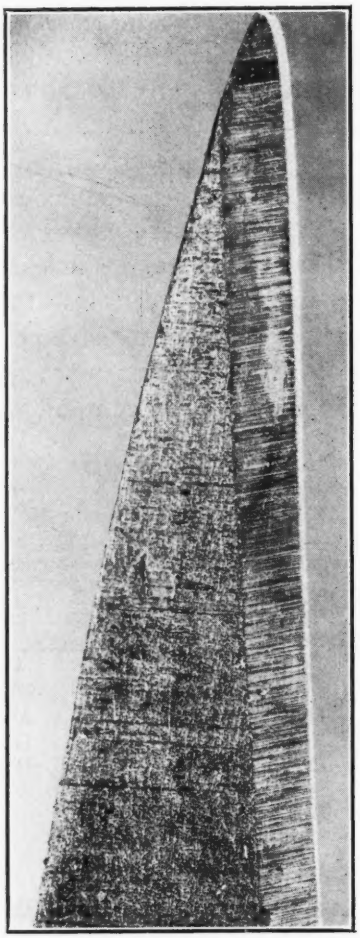

Fig. 20.—Photomicrograph of cutting edge of knife blade in Bard-Parker solution three hours.

examined under the microscope and only the perfect blades accepted for study. The following grades were determined for a comparative study:

A: Perfect cutting edge.
A–: One or two imperfect spots or nitches.
B+: Three or four imperfect spots or nitches.
B: Deep nitches or more than four imperfections.
B–: Decidedly imperfect.
C: Very bad edge.

METHODS OF STERILIZATION OF INSTRUMENTS

Dr. Hasseltine in 1917 very carefully considered the subject, reviewing in turn the following methods of sterilization: (1) boiling in water; (2) use of

boiling water; (3) passing instrument through free flame; (4) moist heat in an open or closed chamber; (5) dry heat in a closed chamber; (6) use of carbolic acid followed by alcohol; (7) formaldehyde gas in an air-tight chamber; (8) mercuric iodide disks and other chemical methods; (9) moist heat at 80°. In his conclusions he recommends as the method of choice, boiling for at least ten minutes in 0.25 per cent sodium hydroxide. Without any doubt, boiling is at present the most generally used method of sterilization, and its only dis-

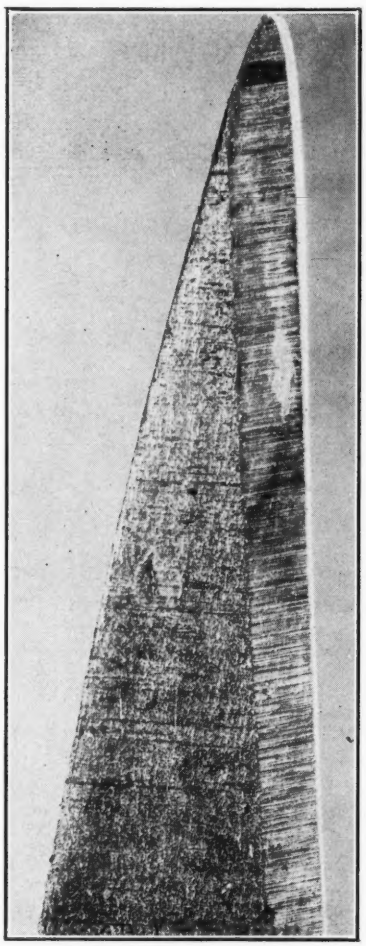

Fig. 21.—Photomicrograph of cutting edge of knife blade autoclaved for three hours.

advantages are: (1) the sharp edges of cutting instruments are definitely dulled; (2) the deleterious action of any chemical impurity, especially in hard water, is increased; (3) there is sometimes set up an electrolytic action which will cause erosion and which will tend to promote rust; and (4) boiling for short periods does not kill the spores of spore-bearing organisms.

However, the exact mode of killing the organisms does not interest the practicing dentist and surgeon so much as does the assurance that all will be killed, in some manner, under certain conditions.

The methods of sterilization employed at present in most dental offices may be classified as follows:

Thermal
- Boiling in water
- Passing an instrument through a free flame
- Moist heat in a closed or open chamber

Chemical
- Alcohol 70 per cent
- Phenol
- Metaphen
- Bard-Parker solution

The efficiency of most of these methods was tested, and the advantages and disadvantages of each were considered.

TABLE XVI

THERMAL DEATH POINTS

A AGAR PLATE	1			2			3		
	A.	B.	C.	A.	B.	C.	A.	B.	C.
	I	II	III	IV	V	VI	VII	VIII	IX
Control (before boiling)	+	+	+	+	+	+	+	+	+
Boiling for 15 seconds	−	+	−	+	−	−	+	+	+
Boiling for 30 seconds	+	+	−	+	−	−	+	+	+
Boiling for one minute	−	−	−	+	−	−	+	−	+
Boiling for two minutes	−	−	−	+	−	−	+	−	+

B AGAR PLATE	1	2	3
		B.	
	X	XI	XII
Control (before boiling)	+	+	+
Boiling for five minutes	−	−	−
Water after five minutes	−	−	−
Boiling ten minutes	−	−	−
Water after ten minutes	−	−	−

C AGAR PLATE	COTTON SWABS AND B		
	1	2	3
	XIII	XIV	XV
Control (before autoclaving)	+	+	+
Autoclaving at 15 lb. for 2 minutes	−	−	−
Autoclaving at 15 lb. for 5 minutes	−	−	−

a. Material from culture partially dried on knife.
b. Material from culture partially dried on forceps.
c. Material from culture put directly into boiling water.
1. Culture of ordinary mouth bacteria in brain broth.
2. Culture of ordinary mouth bacteria on blood agar.
3. Pure culture of B. anthrax (negative).
1. and 2. contain streptococci, staphylocci, gram positive and negative bacilli, cocci, and diplocci.

STERILIZATION BY STEAM UNDER PRESSURE

This procedure is used almost entirely by the French. The apparatus used is known as the autoclave. It consists of a strong boiler in the bottom of which a small quantity of water is placed. Inasmuch as the amount of aqueous vapor in a given space, as well as the temperature, in the case of confined steam, is greater than with flowing steam, it follows that the autoclave is considerably more efficient.

Sterilization at 250° F. is equal to 121.6° C. The Fahrenheit scale designates the freezing point of water at 32° and the boiling point at 212°. The

number of degrees between any point of Fahrenheit scale and 32 points, if divided by 1.8 will give the corresponding point on the centigrade scale. On the centigrade scale the freezing point of water is zero and the boiling point 100.° If any degrees on the centigrade scale, either above or below zero, be multiplied by 1.8, the result will in either case be the number of degrees above or below 32°, or the freezing point, of Fahrenheit.

The idea of autoclaving instruments is not new, but it is the method of application of this principle, through metal containers, that has solved our

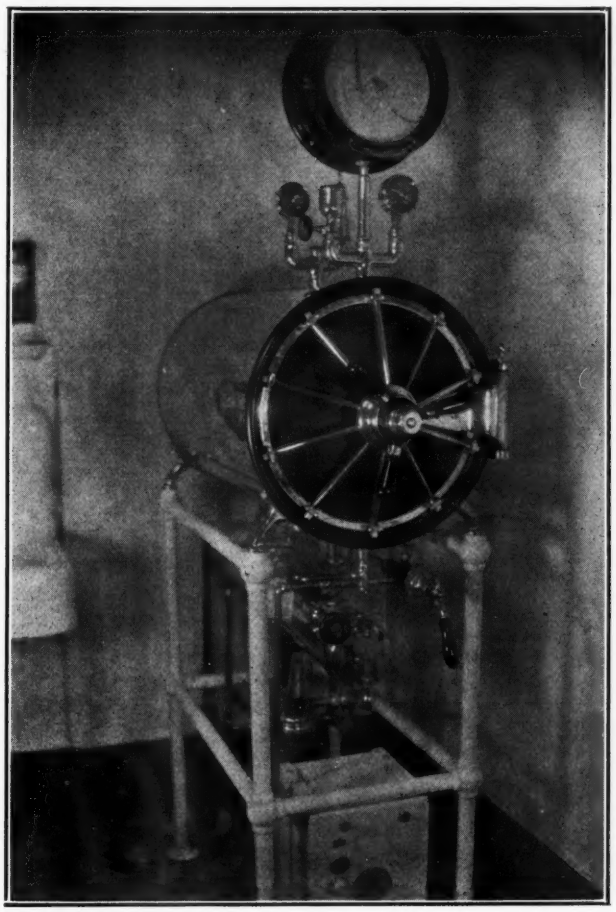

Fig. 22.—Autoclave closed. Also showing recording dial.

individual problem. Pressure steam sterilization produces temperatures that are thoroughly destructive of bacteria, and meets more exacting requirements. Steam at 130° C. under pressure instantaneously destroys spores that would resist flowing steam at 100° C. for five or six hours.

In our plan we have different types of standard sets of instruments in daily use. A number of each of these sets, sterilized, are always on hand. The instruments, after being washed thoroughly, are dried, enclosed in one large towel with a towel for the patient, a towel for the operator, hypodermic syringe, and the set is put into a metal container. The lid is fastened down, and the

contents are kept for ten minutes under eighteen to twenty pounds pressure in the autoclave, where special racks hold twelve metal containers at one time. The entire time for the sterilization is thirty minutes, and the cost is about nine cents for electricity.

When needed, one of the metal containers is taken to the operating room by the nurse. The patient does not see the instruments until the operation starts. The nurse removes the lid from the container. The doctor, after scrubbing up, lifts the towel containing everything needed, places it upon the table,

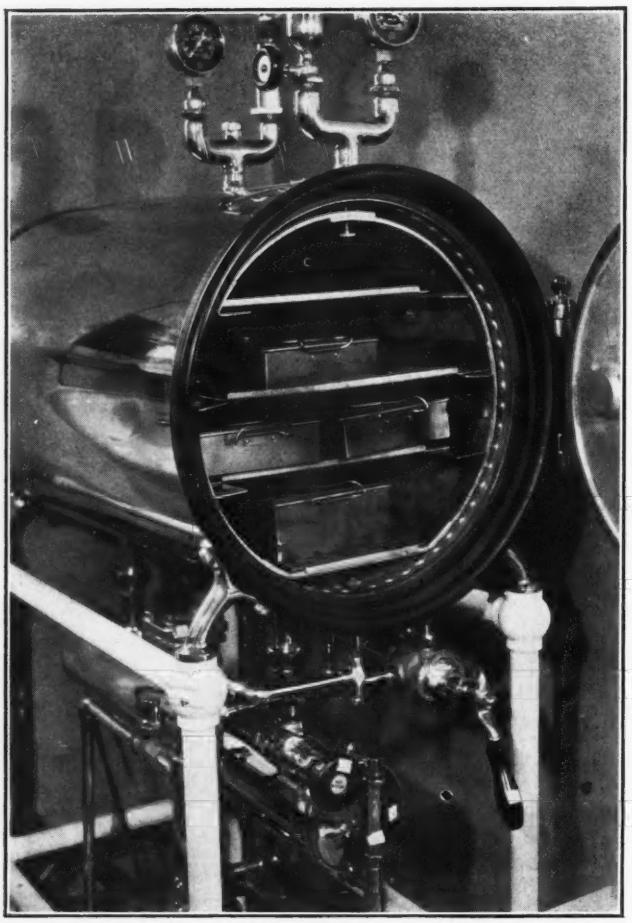

Fig. 23.—Autoclave, interior view, showing four metal containers ready for sterilization.

and arranges everything to suit his convenience. Of course, where practicable, a nurse, under due precautions, can do this for him. These instruments are absolutely sterile, have not been exposed to the air, and are handled only by the operator, who can take pains not to touch anything foreign to the operative field after scrubbing up. It is recommended that syringes be sterilized individually for each patient, with the instruments.

Steel rusts when exposed to moist air, especially if the air is hot. Heavy instruments retain sufficient heat to vaporize moisture rapidly after the steam escapes. Only the light, delicate parts need special protection. Absorbent fabric, such as a towel, should be placed in the bottom of the instrument tray

The instruments, spread out upon this, may then be covered with another towel. The towels collect the condensation as fast as it occurs. This dissipates the free moisture and permits its rapid vaporization. Without absorbent covers, a considerable amount of water is condensed on the surfaces of the instruments. Where drops of water stand and later vaporize, spots or tarnish appear. The liberal use of oil in wiping instruments before they are put away prevents rusting sufficiently to warrant the trouble. This may be done by

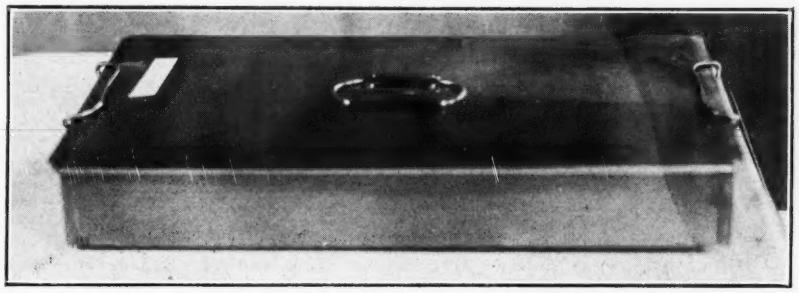

Fig. 24.—Metal container closed.

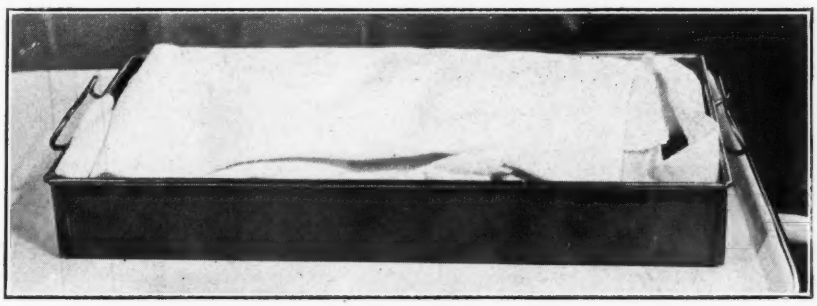

Fig. 25.—Metal container open, showing contents.

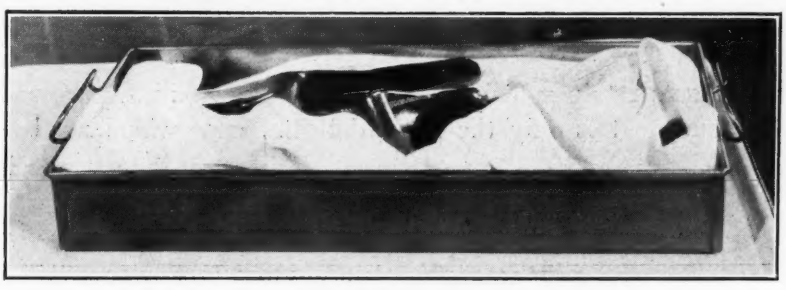

Fig. 26.—Metal container open, showing contents.

wiping with an oily cloth. Enough oil remains on the surfaces to protect them against rust in handling and in the pressure sterilizer.

When the chamber gauge reaches fifteen pounds, the time is noted as the beginning of the sterilization period. The pressure in the chamber is regulated in accordance with the following schedule:

Dressings (heavily loaded)	25 to 30 minutes at 15 to 22 pounds.
Dressings (light load)	15 to 20 minutes at 15 to 22 pounds.
Utensils	10 to 15 minutes at 15 to 22 pounds.
Instruments	7 to 10 minutes at 15 to 22 pounds.
Rubber gloves	15 minutes only, at 14 to 16 pounds.

As soon as the sterilization has been completed, the steam is exhausted from the chamber in the usual manner and the final vacuum created as quickly as possible. Then the vacuum breaker is opened at once, and the door unlocked and loosened from the seat just enough to permit vapor to escape. The instruments are left in the sterilizer until vapor stops flowing from the top of the door and a minute or so longer if time permits. Any moisture on the instruments then vaporizes and quickly passes out.

In pressure steam sterilization,. scalpels and other sharp instruments and those having sharp points should have the edges or points wrapped in cotton to protect them in the sterilizer from mechanical injury and to absorb the free moisture which would otherwise condense upon them and cause tarnishing.

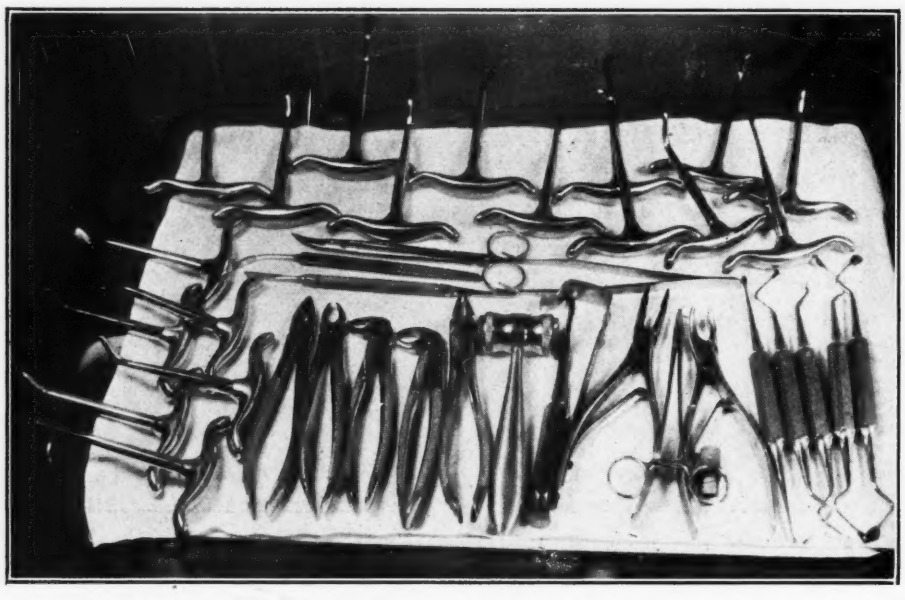

Fig. 27.—Complete surgical set-up; instruments sterilized and arranged ready for operation.

Heavy instruments retain sufficient heat to vaporize this moisture rapidly after the steam escapes. It is only the light, delicate parts which need this special protection.

TABLE XVII

PRESSURE AND TEMPERATURE

5 pounds	pressure	107.7° C.	227° F.
10 "	"	115.5	240
15 "	"	121.6	250
20 "	"	126.6	260
25 "	"	130.5	267
30 "	"	134.4	274

Tests conducted at the U. S. Naval Medical School showed that in order to obtain and maintain the above pressure-temperature relations the sterilizer chamber must be free and kept free of a maximum amount of air during the period in which steam enters the chamber. This can be accomplished by keeping the chamber drain valve slightly but continuously open. Failure to properly expel air results in marked deviation from the normal pressure-temperature re-

lation. For example, in one test where the air was not expelled until the chamber pressure reached 20 pounds, the temperature within the chamber at 10 pounds pressure was only 78° F. and at 20 pounds pressure only 140° F.

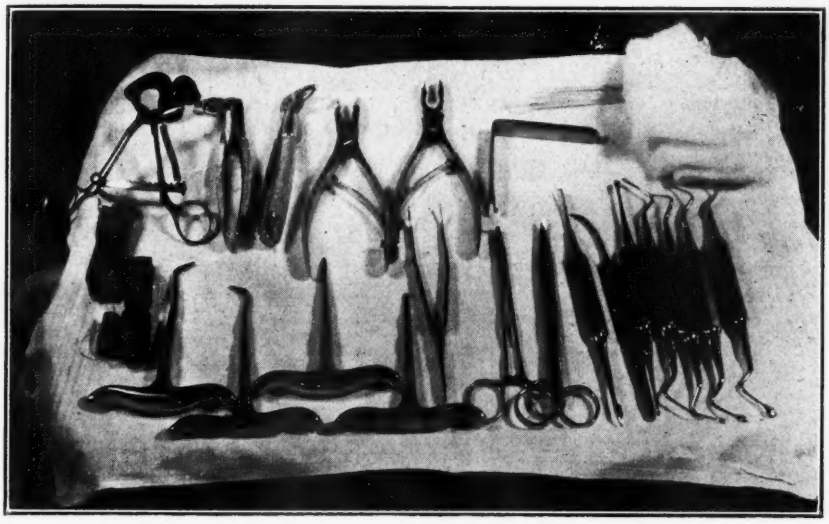

Fig. 28.—Set-up for removal of mandibular teeth; instruments sterilized and ready for operation.

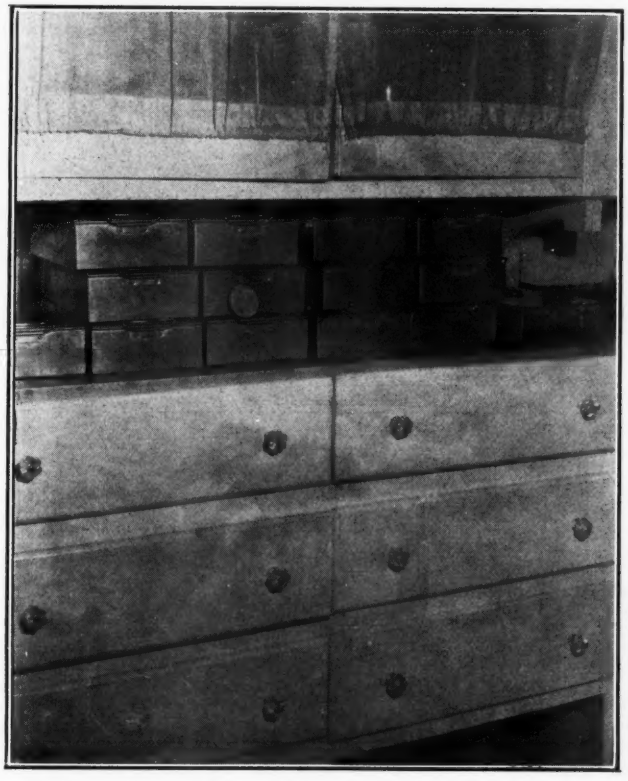

Fig. 29.—Showing pans containing sterilized instruments, and drawers containing extra stock instruments.

The chart record of performance of autoclaving gives added assurance that sterilization is being completed properly. The surgeon wants to know exactly

what procedure is being followed in sterilizing. He should demand daily proof that exacting standards of performance are being followed.

The recording steam gauge tells the exact story daily in red ink on an 8″ circular chart for every sterilizing process carried out during the day, what pressure was maintained and for how long.

If the nurse is careless about time or otherwise in the handling of the sterilizer, the chart detects the error or carelessness. A correct chart can be established as the guide and every chart made to conform in shape. Departure from the correct chart is immediately detectable by the nurse herself. She will resterilize, if necessary, to avoid the use of improperly sterilized materials.

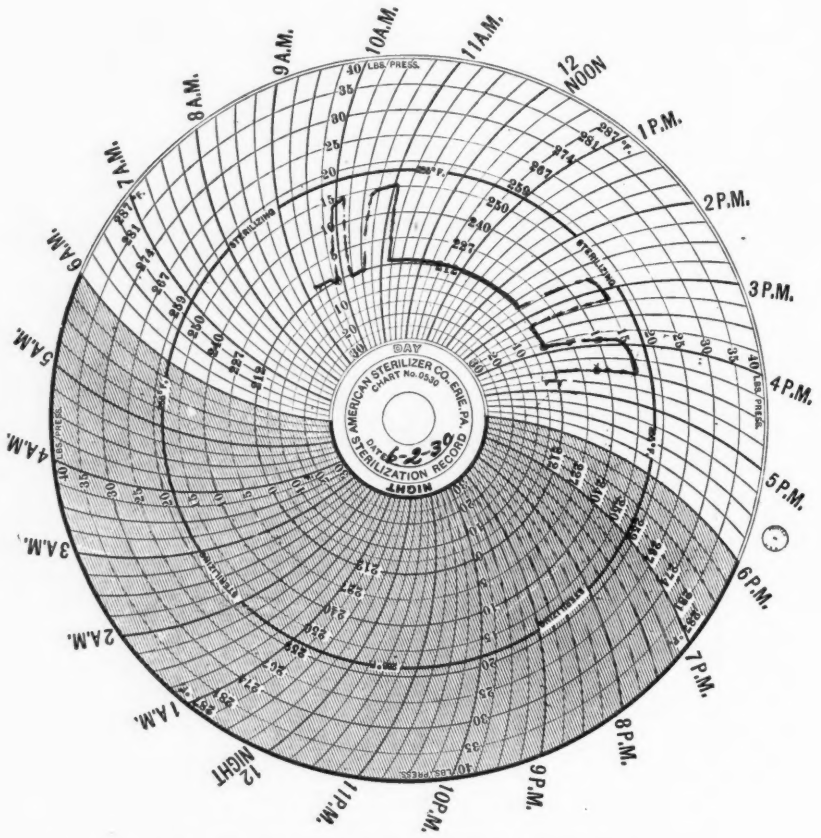

Fig. 30.—Record of sterilization in autoclave.

The surgeon can check these charts at any time. Some authority should check them daily. Thus, irregularities of every kind are eliminated, and uniform procedure is established and maintained.

Charts, such as these, present the actual day's record of each sterilizer—a guide to the nurse, important information to the doctor, and a permanent record for filing.

Perfect sterilization can be accomplished by hand control of air elimination, until recently the only known method, but that process is highly exacting, and it demands careful control of several valves. It requires more or less constant attention during the entire sterilizing period.

Caution, training, experience, and watchfulness minimize occurrence of error. The automatic control relieves the attendant during the sterilization period for other duties.

Fig. 30 is a chart showing the graphic picture of sterilization for four periods during the day as follows:

First period, 18 pounds pressure as shown on outside of gauge for ten minutes.

Second period, 18 pounds pressure for fifteen minutes.

Third period, 18 pounds pressure for twenty minutes.

Fourth period, 18 pounds pressure for twenty-five minutes.

It will be seen from this chart that the pressure on the inside of the chamber was fifteen pounds in all four instances and that the temperature was constant at 250° F. The advantages of this method over the boiling technic are:

(1) More complete sterilization.

(2) Less difficulty in getting instruments from the sterilizer to the patient without contamination.

(3) Less damage to the instruments.

(4) Cotton-gauze applicators, etc., may be sterilized and resterilized.

ABSTRACT OF
CURRENT LITERATURE

NUTRITION AND PEDIATRICS

By Samuel Adams Cohen, M.D., New Yerk City

It is the purpose of this Journal to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Digestion-Efficiency With Various Foods and Under Various Conditions. J. H. Childrey, W. C. Alvarez, F. C. Mann. Arch. Int. Med. **46:** 3, 1930.

These experts, reporting from The Mayo Clinic and The Mayo Foundation, Rochester, Minn., tell of their very interesting and highly instructive observations on the digestion of various food substances injected in six dogs. They noted that sour milk was better digested than sweet milk, and also that milk was more digestible when given with any of the following—meat, raw eggs, potato, Karo syrup and bread. Their observations with large amounts of lactose confirmed the results of others, in that it proved to be a laxative which not only interfered with the food eaten that day, but also interfered with the foods eaten the following day.

In regard to such popular foods as meat and eggs, these investigators found that meat was best digested when given in the form of lumps, and that raw meat was handled better than cooked meat; soft boiled and hard boiled eggs were both digested better than raw egg albumen, which, as has been previously demonstrated by Hosoi, was hardly digested at all, and the authors confirmed the results of Rose and MacLeod, who found that raw egg white was better utilized after it was beaten up with the air. Moreover, they justify the popular use of eggnog without alcohol, because they noted that the addition of milk to raw egg resulted in a mixture which was better digested than egg alone.

As a result of these experiments Childrey and his coworkers state that potatoes, stewed tomatoes, baked bananas, stewed prunes, stewed corn and beets were all poorly digested and gave residues in the stool of the dogs varying in amount from 30 to 75 per cent.

In their discussion on the influence of various factors on digestion, the writers confirmed the interesting findings of Alvarez, who found that excitement and anxiety retarded the digestion of food, and that of Hawk who found that the temperature of food had no effect on the completeness of digestion. These experts also emphasized two very practical points in digestion of foodstuffs: (1) when food is taken in one large amount, it is better utilized than when taken in several fractions at half-hour intervals; and (2) as mentioned

before by Alvarez "persons just recovering from an attack of diarrhea often have so little ability to digest anything, that for a few days they must partake sparingly of only the more digestible foods."

Plasma Calcium and Organic Phosphorus Following Intravenous Injection of Parathyroid Extract—A Study on the Source of Mobilized Calcium. Chiau Tsai and Fong-Yen-Hsu. Chinese J. Physiol. **4**: 3, 1930.

The authors accept the well-known action of Collip's parathyroid extract, which establishes the fact that one of the functions of the parathyroid glands is to maintain the blood calcium at a constant level. In an experimental study on four healthy dogs, the writers injected them intravenously with a single dose of parathyroid extract and found that both plasma calcium increased immediately and inorganic phosphorus increased about two hours after the injection. As to how the parathyroid hormone mobilizes the calcium phosphate of bone, they are inclined to fall in with the assumption of Greenwald who stated that one of the actions of this hormone is to dissolve the calcium phosphate, which is held in extremely insoluble form by the bone, with the liberation of calcium and phosphorus from the bone.

Are There Indications for Operations on the Adrenal Glands? George W. Crile. N. Y. State J. Med. **30**: 20, 1930.

In a highly instructive and interesting article, Crile takes up the functions of the adrenal glands and their particular interrelationship with the other organs of the body, especially the thyroid gland and the stomach. It is well known that the adrenal glands are concerned in all of the major activities of the organism. This is readily noted when there is an insufficiency in the functions of the adrenal glands, in that the voluntary muscular system becomes weak and depressed, and, in addition, the involuntary muscular system and its innervation are also profoundly depressed since the heart and blood vessels are unable to maintain a normal blood pressure.

Incidentally, it is encouraging to note that recently Steward and Rogoff, Hartman and others have prolonged the lives of adrenalectinized animals by means of a hormone which has been isolated from the adrenal cortex.

On the other hand, the effects of hyperactivity of the nerve-adrenal system lead to a syndrome which resembles mild hyperthyroidism, concealed tuberculosis, and other chronic infections, such as recurring fatigue, exhaustion, gastric hyperacidity, rapid heart action, fine tremors, sweating hands, and dilated pupils.

With these clinical pictures of adrenal hyperactivity and adrenal insufficiency in mind, this eminent authority and investigator attempted in a few instances to reduce and control the effects of the adrenal activity by performing in a series of 22 cases unilateral adrenalectomies on individuals who had epilepsy, neurasthenia, cardiovascular disease, and Raynaud's disease. Crile states that his results were negative in his cases of Raynaud's disease, and of doubtful value in the other conditions. Several of these cases had a partial thyroidectomy in addition to a unilateral adrenalectomy.

This Cleveland surgeon states that the symptoms of hyperthyroidism and adrenalism are the same in the body. He points out that the thyroid gland acts as a building up or charging mechanism, and the adrenals as a discharging mechanism. In other words, clinically and experimentally this correlation of clinical phenomena is due to an antithesis of functions of the thyroid and adrenal glands.

Crile writes that since hyperthyroidism depends in part upon the interrelation between the thyroid, the nervous system and the adrenal glands, this condition should be controlled in a measure by lessening of adrenal activity. In 17 cases of residual hyperthyroidism which occurred after a partial thyroidectomy, one adrenal gland was removed, and Crile reports that the symptoms were controlled. The author mentions the observation commonly noted that there is increased gastric activity in hyperthyroidism, while in myxedema there is a low acidity or anacidity. Moreover, because hyperthyroidism and peptic ulcer occur in the same type of individual, and also because peptic ulcer occurs under conditions similar to those which produce hyperthyroidism, Crile and his associates have been led to study the relationship of the thyroid and the adrenal glands to the production of peptic ulcer. From animal experiments and in four cases of intractable peptic ulcer, in which a unilateral adrenalectomy and a partial thyroidectomy were performed, Crile believes that denervation of the adrenal glands gives promise of good results in cases of recurrent gastric ulcer in which medical and surgical treatment have been ineffectual.

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EDITORIALS

Health and Accident Policies, or What Constitutes Disability

A SHORT time ago, a friend of mine asked me how much health and accident insurance I carried. Much to his surprise, I told him that I did not carry any; whereupon he asked the reason, to which I replied that from my experience and observation, health and accident policies had been very unsatisfactory. My dealings with such companies in the past had been so unsatisfactory that I had concluded that I could carry my own liability much cheaper and much more satisfactorily than it would be carried by a company.

It is quite strange that only a short time elapsed after the above conversation took place when a very striking case was called to my attention regarding the unsatisfactory attitude of a certain large company which has written a great many health and accident policies and life insurance policies

with disability features for the dental profession. A great many of these policies contain a disability feature in which it is stated that, "In the event of the policyholder becoming disabled, the company will pay him so much per month for life, or as long as he is totally disabled." The particular case which has been called to my attention involves a policyholder who carries a $10,000.00 life insurance policy, containing a disability clause whereby the company is to pay him $100.00 per month if he is totally disabled. While I have not seen the original policy, the dentist who is the policyholder claims $100.00 per month is to be paid during the rest of his life if he is unable to follow his occupation, his occupation being that of dentistry. If the policy is so written, there seems to be very little ground for the company refusing to live up to the contract. The facts of the case are that the dentist, as a result of an infection, lost the major portion of his thumb on his operating hand; without any question, the company admitted its liability and continued to pay the dentist $100.00 per month for two and a half years, but, "a short time ago," so the dentist states, "they quit writing this disability coverage to members of the dental profession, and now they are trying to repudiate contracts held by disabled members of the profession." The contention of the insurance company is that a dentist can overcome the loss of the major portion of the thumb on the operating hand, and again resume the practice of dentistry. It is very probable that the insurance company has learned of some dentist who has lost the major portion of his thumb and is still practicing a certain part of dentistry. It is using this case in attempting to prove that any dentist who has lost the thumb on his operating hand can practice dentistry. I contend that such an interpretation is entirely wrong, because it would depend upon the ability of the individual and also upon what line or branch of dentistry he practiced. What would be possible for one person would not be possible for another.

Ordinarily, the loss of both hands would render the average individual quite incompetent and disabled. However, I remember seeing one freak who had no hands, yet he was able to perform the usual acts that are done by people who possess hands. He had so trained and developed his feet and the muscles of his legs that the things he did were almost unbelievable. It would be just as logical for insurance companies to cite this freak and claim the loss of hands did not produce total disability because this particular individual could do everything with his feet that an ordinary individual could do with his hands. Yet, an insurance company contends that if one dentist can perform certain dental operations after having lost the major portion of his thumb on his operating hand, the loss of a thumb does not produce disability in regard to the practice of dentistry.

I am referring to this case because it behooves every dentist who carries a life insurance policy containing a disability feature, to see that the clause is so written as to include "disability to practice dentistry" as meaning total disability as interpreted in the policy. We realize that a dentist who had lost the thumb of his operating hand might follow another occupation sufficiently satisfactory to produce some income. Insurance policies held by

dentists which simply mention "total disability" are practically useless so far as offering any real protection to the dentist.

We believe the importance of this suit as related to the dental profession cannot be overestimated. If the insurance company should succeed in establishing a claim that the loss of a thumb on the operating hand does not constitute total disability in the case of the dentist, it would probably very soon go a step farther and claim the loss of a hand would not constitute disability. I understand the company in question has written policies for about two thousand dentists.

The INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOGRAPHY will do what it can to assist in having this case satisfactorily settled in favor of the dentist.

NEWS AND NOTES

Orthodontia Department of Washington University School of Dentistry

The dental department of the Washington University, St. Louis, Mo., has established a full-time interneship of one year in orthodontia.

The department is in the charge of Dr. H. C. Pollock; and one year's interneship, which is in the nature of a full year's postgraduate course, has been assigned to Dr. E. V. Holestine, Ava, Mo.

Future applicants who care to take advantage of this course should address all communications to Dr. R. E. Fobes, Registrar, Washington University School of Dentistry, 4559 Scott Avenue, St. Louis, Mo.

The Southwestern Society of Orthodontists

The Southwestern Society of Orthodontists will meet in San Antonio, Texas, January 7, 8, 9, 10, 1931. January 7 will be devoted to golf, and some of the members will be in San Antonio in advance of that time, perhaps on January 4, 5, and 6, in order to have a hunting and fishing trip on the Gulf before the meeting starts.

DR. CURTIS WILLIAMS, Secretary,
716 Medical Arts Bldg.,
Shreveport, La.

New York Society of Orthodontists

The fall meeting of the New York Society of Orthodontists will be held at the Hotel Commodore, Monday, November 24, 1930. This will be an all-day session beginning at 9:30 A.M. An exceptionally interesting program has been arranged. All interested physicians and dentists are cordially invited.

LOWRIE J. PORTER, Secretary,
730 Fifth Avenue,
New York, N. Y.

Chicago Dental Society Midwinter Meeting

The sixty-seventh annual meeting of the Chicago Dental Society will be held at the Stevens Hotel, Chicago, February 2, 3, 4 and 5, 1931.

Because of the great demand last year, the transactions of this meeting will be bound and made available at cost to those who wish them.

The program committee, Dr. Stanley D. Tylman, chairman, has practically finished its work and will present, for the approval of the profession, one of the best programs in the history of the Society.

The exhibition hall of the Stevens Hotel has again been reserved by the Exhibit Committee, of which Dr. C. Davidson is chairman, for manufacturers' and dealers' exhibits and will as always be a center of attraction.

The Society extends a cordial invitation to attend to all members of the American Dental Association.

HARRIS W. MCCLAIN, President,
55 E. Washington St.,
Chicago, Ill.
HOWARD C. MILLER, Secretary,
55 E. Washington St.,
Chicago, Ill.

American Society of Orthodontists

The Thirtieth Annual Meeting of the American Society of Orthodontists will be held on April 21, 22, 23, and 24, 1931, at the Jefferson Hotel, St. Louis, Missouri.

Dr. Harry E. Kelsey, President,
833 Park Avenue,
Baltimore, Md.
Dr. Claude R. Wood, Secretary,
Medical Arts Building,
Knoxville, Tenn.

Southern Society of Orthodontists to Meet in January

The eleventh annual meeting of the Southern Society of Orthodontists will be held at the New Fleetwood Hotel, Miami Beach, Florida, January 13, 14, 15, 1931.

The Board of Censors is preparing a program that will be both interesting and of high scientific value.

Among the essayists will be Dr. Alfred P. Rogers of Boston, Dr. A. LeRoy Johnson of New York City, Dr. Herbert A. Pullen of Buffalo, Dr. Frank M. Casto of Cleveland, and Dr. W. W. McKibben of Miami.

An invitation is extended to all members of the dental and medical professions to attend this meeting.

Carlton B. Mott, President,
Flatiron Building,
Asheville, N. C.
Oren A. Oliver, Secretary-Treasurer,
Medical Arts Building,
Nashville, Tenn.

Greater New York December Meeting for Better Dentistry

The sixth Greater New York December Meeting for Better Dentistry will be held at the Hotel Pennsylvania, New York City, December 1-5, 1930.

As in former years, there will be scientific papers, lecture or teaching clinics, topic discussions, scientific section meetings, and general clinics.

A special feature of this year's meeting will be one full afternoon devoted to the economic side of dentistry. At this session, efficient office conduct will be presented, also valuable information on wise and prudent methods of saving and investments for professional men.

All members of the American Dental Association are eligible to register. Registration fee $5.00.

A subscription blank and list of clinics will be ready for distribution about November 15.

There will be a manufacturers' exhibit in the hotel during the entire meeting.

A Call to Graduates of the Angle School of Orthodontia

A suggestion has been made by a number of graduates of the Angle School of Orthodontia that we hold a gathering of a social nature at a dinner to be given just preceding the meeting of the American Society of Orthodontists to be held at St. Louis, Mo., in 1931.

The American Society of Orthodontists was organized in St. Louis on June 1, 1900. This is a cogent reason, but only one of the reasons, why we should get together at this time and place. All who favor this idea will kindly and promptly communicate with

Richard Summa,
5552 Etzel Avenue,
St. Louis, Mo.

The Eastern Association of Graduates of the Angle School of Orthodontia

A regular meeting will be held at the Vanderbilt Hotel, New York City, on Monday and Tuesday, January 26 and 27, 1931. This meeting will be a memorial to the late Edward H. Angle.

E. SANTLEY BUTLER, Secretary,
576 Fifth Avenue,
New York, N. Y.

Second International Orthodontic Congress

The Second International Orthodontic Congress will be held in London in 1931 at the Hotel Great Central from July 20 to 24 inclusive.

The officers of the Congress will be as follows:

President-General	J. H. Badcock
Vice-President-General	G. Northcroft
Treasurer-General	E. D. Barrows
Secretaries-General	A. C. Lockett
	B. M. Stephens

A list of honorary presidents and vice-presidents will be communicated later.

A full and interesting program of papers and demonstrations is anticipated, and a museum is being organized. Suitable entertainment for ladies accompanying members will be arranged. Intending contributors to the activities of the Congress can obtain from the Secretaries of their respective orthodontic (or dental) societies the conditions under which contributions are invited. The Secretary-General (Mr. A. C. Lockett, 75 Grosvenor Street, London, W. 1) will also be glad to give any further information on request.

Information regarding travelling facilities and hotel accommodation may be obtained from the official agents to the Congress, Messrs. Morgan Pope & Co., of 7 St. James's Street, London, S. W. 1; 6 Rue Caumartin, Paris; 71 Vanderbilt Avenue, New York; Messrs. Noel Vester & Co. (agents), 44 Unter den Linden, Berlin.

The Dental Society of the State of New York

The sixty-third annual meeting of the Society will be held May 12, 13, 14, and 15, 1931, at Hotel Pennsylvania, New York City.

A cordial invitation is extended to all dentists, members of the American Dental Association, and to all ethical Canadian dentists.

Dr. John T. Hanks, 17 Park Ave., New York City, is Chairman of the Exhibits Committee. Address Dr. Hanks for information relative to space and terms.

Dr. Fred R. Adams, 7 W. Fortieth St., New York City, is Chairman of the Clinic Committee. Under his direction a new plan will be presented in the presentation of the Educational Clinics. Dr. Adams will be pleased to hear from ethical dentists willing to present clinics of merit.

For general information address the Secretary, Dr. A. P. Burkhart.

DR. ALFRED WALKER, President,
100 W. 59th St., New York City.

DR. A. P. BURKHART, Secretary,
57 E. Genesee St., Auburn, N. Y.

Dallas Mid-Winter Dental Clinic

The Dallas Mid-Winter Dental Clinic will be held February 16, 17, 18, 1931. The following clinics will be presented: Crown and Bridge by Dr. H. G. Morton of Milwaukee;

Surgery by Dr. Arthur C. Engle of St. Louis; Prosthetics, the clinician has not yet been selected. There will be exhibits by national manufacturers.

DR. ROLAND LYNN,
1807 Medical Arts Building,
Dallas, Texas.

Eighth International Dental Congress

The Eighth International Dental Congress is to be held in Paris, August 3-8, 1931.

An important exhibition of dental equipment and supplies will be connected with this Congress and will unite exhibitors from all the countries in the world.

The French Government has placed at our disposal the premises of the Grand Palais des Champs Elysées. In order to be able, already now, to proceed with the repartition of the rooms, we desire to collect as quickly as possible the names of suppliers susceptible of taking part in this exhibition. Consequently, we should be glad if you would inform us whether you intend to participate in this exhibition of the Eighth International Dental Congress and, eventually to indicate what space you would require. Your reply will not constitute an engagement on your part, nor on ours. We request same by way of information, to enable our establishing already now, the spaces which will be required.

The terms will be fixed shortly; we think that the rent, for the duration of the Congress will come to about 500 frs. per square metre.

HENRI VILLAIN,
Commissaire Général des Expositions.

December Meeting of the Society for the Advancement of General Anesthesia in Dentistry

The next meeting of the Society for the Advancement of General Anesthesia in Dentistry will be held on Monday evening, December 15, at the Barbizon-Plaza Hotel, northwest corner of Fifty-Eighth Street and Sixth Avenue, New York City at 7 P.M. The meeting will open with a dinner at 7 o'clock, and the scientific session is scheduled to start at 8 o'clock promptly.

Dr. Wm. J. McLaughlin, chief of the dental staff of St. Vincent's Hospital in Bridgeport, Conn., will read a paper entitled, "Considerations of Technic Concerned in the Induction and Maintenance of a Short and a Prolonged General Anesthesia for Dental Surgery." The discussion will be opened by Dr. Walter F. Barry of Newark, N. J.

Following Dr. McLaughlin's paper, Dr. Paul M. Wood of New York City, director of anesthesia at Lincoln Hospital and assistant attending anesthetist at Roosevelt and Fifth Avenue Hospitals, New York City, will speak on "A Comparison of the Phenomena of Normal Physiologic Respiration and Anesthetic Respiration."

Membership in this society is open to all ethical practitioners, and correspondence is invited. Meetings are held four times a year on the third Monday of October, December, February and April, in New York City.

M. HILLEL FELDMAN, D.D.S., President,
730 Fifth Avenue,
New York City.

LEONARD MORVAY, D.D.S., Secretary,
76 Clinton Avenue,
Newark, N. J.

JAMES T. GWATHEMEY, M.D., Honorary President,
30 W. Fifty-Ninth Street,
New York City.

Notes of Interest

Dr. Roy Woodworth announces his location in Suite 713-14, National Reserve Building, Topeka, Kan. Practice limited to orthodontia and pediadontia.

Dr. Joseph H. Williams, orthodontist, announces the removal of his offices to 201-2 Beaumont Medical Building, 3720 Washington Blvd., St. Louis, Mo.

Dr. P. R. Ashplant announces the opening of his office in the Professional Building, 117 South Second Avenue, Mount Vernon, N. Y. Practice limited to orthodontia.

Dr. Samuel Davis Gore announces the removal of his offices to 1237 Maison Blanche Building, New Orleans, La. Practice limited to orthodontia.

Dr. Frederick R. Stathers announces the removal of his office to Spruce Street Medical Building, 269 South Nineteenth Street, Philadelphia, Pa. Practice limited to orthodontia.